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The PAKISTAN DEVELOPMENT REVIEW

ARTICLES

BOOK REVIEWS

Volume 55 **Summer 2016** **Number 2**

www.pide.org.pk

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The PAKISTAN DEVELOPMENT REVIEW

Volume 55 Number 2
Summer 2016

C O N T E N T S

©*The Pakistan Development Review*
55:2 (Summer 2016) pp. 79–93

A Raging Bull or a Long-term Speculative Bubble? The Puzzling Case of the Karachi Stock Exchange

EHSAN AHMED, J. BARKLEY ROSSER, JR., and JAMSHED Y. UPPAL

The objective of the study is to examine possible presence of nonlinear speculative bubbles in the Karachi Stock Exchange (KSE). Bubbles are argued to exist when there are substantial deviations of market value from the estimated fundamental values. We estimate a series of fundamental values from a four variable Vector Autoregression Model (VAR) using the main KSE100 index along with measures of world stock prices, the Pakistani exchange rate, and the Pakistani short-term interest rate. Residuals of this estimated fundamental time series are then tested for possible speculative deviations using a Hamilton regime switching test and a rescaled range Hurst coefficient test, with a further test for nonlinearity beyond the ARCH effects using the BDS statistic. For all of these, we reject the null hypotheses of the absence of speculative bubbles and nonlinearities beyond ARCH in these series. While these results suggest the possible presence of such bubbles, we note methodological limits on proving that due to the problem of mis-specified fundamentals. We further discuss some characteristics of the regulatory environment that may make it especially susceptible to such phenomena and may be considered by the policy-makers for the attenuation of speculative and manipulative behaviour.

Keywords: Bubble, Pakistan, Stock Market, Regime Switching, Rescaled Range Analysis, Nonlinearity

INTRODUCTION

Asset markets in emerging and frontier economies have exhibited high levels of variance with sharp increases followed by even sharper crashes. This has led to widespread discussion that these markets may be exhibiting speculative bubbles in which prices diverge from the fundamental values frequently [Ahmed, Rosser, and Uppal (2010, 2014)]. Among the markets that have been showing such behaviour very markedly has been the Karachi Stock Exchange. The main equity market of Pakistan apparently presents a case of either an ongoing long-term bubble or of recurring bubble. The unprecedented performance of the KSE over the over the 2001-2014 period in particular remains a puzzle to many observers in view of the relatively poor performance of the real sectors of the country's economy. Though alternative explanations, such as structural reforms, favourable tax and regulatory treatment, and technicalities of the stock index construction, have been offered, the existence of speculative bubble, and the possibilities of manipulative behaviour cannot be precluded. It is particularly imperative to examine the questions whether the stock market presents a case of a long-term or a recurring

Ehsan Ahmed <ahmedex@jmu.edu> and J. Barkley Rosser, Jr. <rosserjb@jmu.edu> affiliated with the James Madison University, Harrisonburg, Virginia, USA. Jamshed Y. Uppal <Uppal@cua.edu> affiliated with the Catholic University of America, Washington, DC, USA.

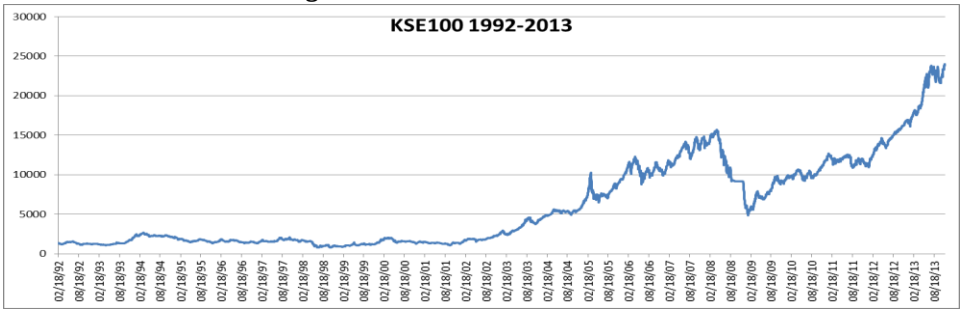
bubble for its implication both for the theory of speculative bubbles as well as for its policy implications. While such bubbles are regarded as destabilising and disruptive to the economy in many ways, these are especially detrimental to sustaining confidence in the fairness and efficiency of the financial markets and to the flow and allocation of real investment that is crucial to the development process.

In this paper we use well-developed methodologies to consider KSE's behaviour more rigorously. The next section describes the historical performance of the KSE indices, noting some popular explanations for its meteoric rise. This is followed by a section on the theory of speculative bubbles. The third section explains our methodology and data used in the study, which is followed by a section on the empirical results. The final section summarises our findings and presents the conclusions. In brief, we find that there is a strong evidence to suggest that this market has been exhibiting speculative bubbles characterised by substantial nonlinearities.

HISTORICAL PERFORMANCE OF THE KARACHI STOCK MARKET

The market's benchmark index, Karachi Stock Exchange 100 Index (KSE100) was launched in November 1991 with a base of 1,000 points.[1] By the beginning of 2001, it had move up to 1508 registering a steady but modest annualised growth rate of 4.5 percent (Refer to Figure 1). The market started to take off right after Pakistan became a major player in the war on terror following the 9-11 terrorist attacks in the US. The KSE100 index skyrocketed to 15,122 by the end of April in 2008, by ten folds, registering a record breaking growth of 31 percent per year. Meanwhile the markets around the world registered a nominal growth rate of only 0.47 percent in the Morgan Stanley Capital International (MSCI) World Index, and the emerging markets a growth of 17.4 percent in the MSCI Emerging Market Index); Figure 2 provides visual comparisons. However, tightening of the monetary policy by the State Bank of Pakistan and an unexpected increase in the interest rates in May 2008, combined with adverse political events and the onset of the Global Financial Crisis, ushered a period of crashing stock prices. By July the index had plunged by one-third of its peak value. In an effort to stabilise the financial markets the regulators set a floor for stock prices on August 28 effectively shutting down the market till December 15 when the floor on stock prices was removed and the trading resumed.

Fig. 1. KSE100 Index — 1992–2013



[1]KSE100 is a market capitalisation weighted index of 100 companies with the highest market capitalisation. However, the company with the highest market capitalisation from each sector is also included to make it more representative of the market.

Fig. 2. KSE Comparative Performance —Local Currency Denominated Indices

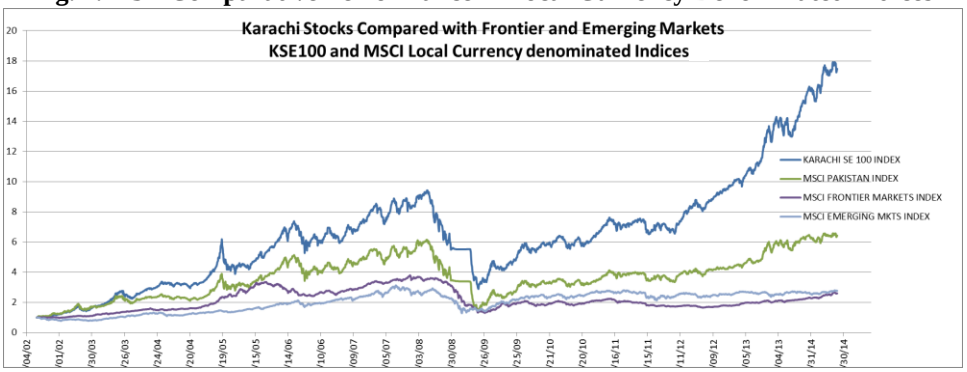


Table 1

Karachi Stock Exchange Summary Statistics

Year	1989	1993	1997	2001	2005	2009	2013
No. of Listed Companies	440	653	781	747	661	651	569
Market Capitalisation (mil. US $)	2,457	11,602	10,966	4,944	45,937	33,238	56,083
Market Capitalisation as Percentage of GDP	6.50%	23.90%	17.40%	6.90%	42.00%	19.80%	15.89%
Trading Value (mil. US $)	231	1,844	11,476	12,455	140,996	23,526	70,406
Turnover Ratio (%)	8.00%	18.70%	103.70%	226.80%	375.70%	82.94%	91.48%
P/E Ratio*	8	27.6	14.8	7.5	13.1	3.9	6.7
Price to Book Value*	1.3	4.2	2.3	0.9	3.5	1.2	2.6
Dividend Yield (%)*	8.30%	1.50%	3.20%	12.50%	2.50%	9.21%	8.87%
% Change in KSE100 Index (Over Previous Period)	–	680.50%	–19.00%	–27.40%	650.60%	–1.78%	169.11%

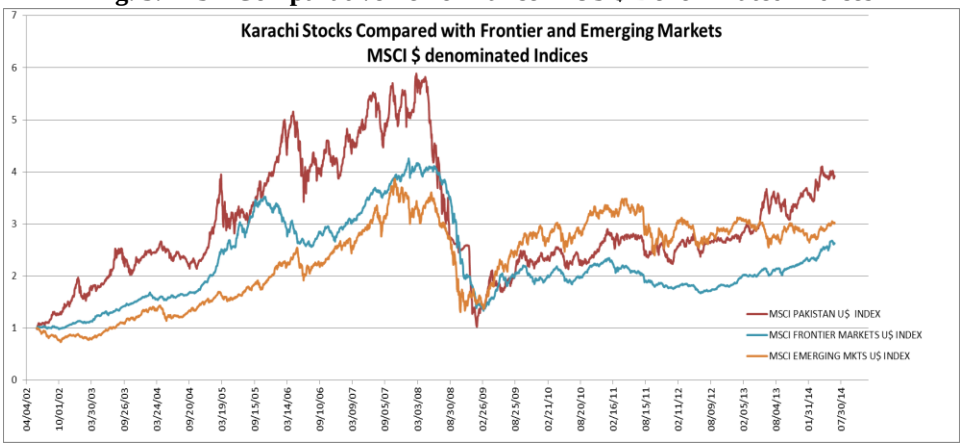
Right after the re-opening of the market it recovered quickly reaching new highs. The KSE100 index which had dropped to 5865 by the end of 2008 continued to rise at a rapid pace. By the end of September 2012 it registered new all-time highs surpassing the previous peak of 15,622. Since then its pace has accelerated and the index's most recent value stands as of 7/1/2014 at 29,702, thus it has increased at a 29 percent annualised rate since its bottom at the end of 2008. In comparison, the MSCI Index for Frontier Markets increased by an annualised rate of 8 percent over this period.

The unprecedented performance of the Karachi Stock Exchange over the last 14 years remains a puzzle to many observers. It is particularly so in view of the relatively poor performance of the real sectors of the country's economy. Over the period 2001-2013 period the economy grew at a rate below the rate experienced by peer countries, except for the years 2004 and 2005 (see Figure 4). The country has been beset by a host of political and economic issues which are a continuing drag on the economy. These include a deteriorated law and order situation, persistent incidence of terrorist attacks,

unsettled political structures, and irresolute economic policies. The weakening economic condition is exacerbated by extraordinary energy shortages, which have inhibited much of the economic life. Being situated next to on-going ISAF[2] anti-insurgency operations in Afghanistan, the country is itself in virtual war conditions, besides facing internal insurgencies, as well as sectarian and ethnic conflicts. The sharp contrast between the performance of the real sector and the stock market is, therefore, prima facie evidence of a speculative market bubble. However, in this case, it seems that either the market has remained diverged from its fundamentals over a long period of time, or it keeps on spawning new speculative bubbles.

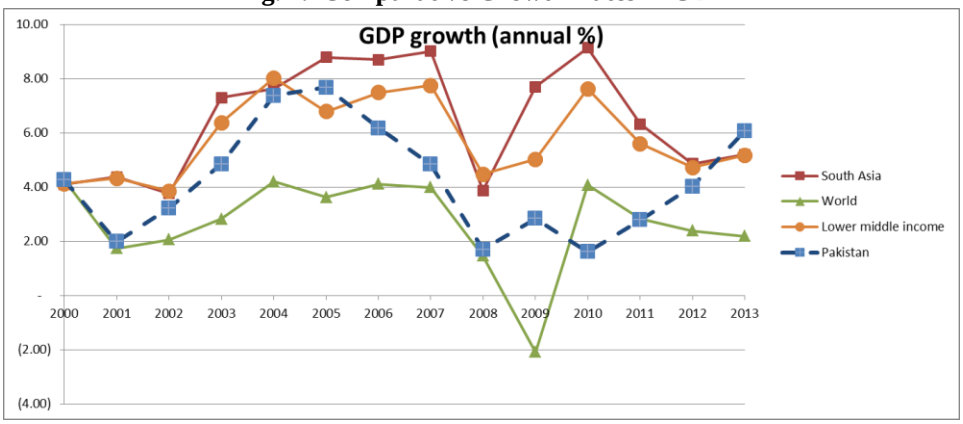
Observers of the KSE's extraordinary performance have advanced explanations based on both technical and fundamental factors. Some explain that the market performance in the recent years may be reflective of the country's potential buoyed by the country's strengthening of democratic institutions and financial markets, continued lending by international financial institutions, and general enthusiasm for "frontier markets" on the part of international investors [*The Economist* (2013)]. The market's continuing rise is also attributed to special tax and disclosure treatment afforded to it by the regulators, such as an amnesty scheme that allows investors to buy stocks with no questions asked about the source of funds, and lower or no tax on capital gains. Critics have pointed out that such provisions open wide possibilities for money laundering legally, and have been the major impetus for cash inflows into the stock market, especially considering rather lax enforcement on part of the market regulators [Houreld (2013)]. A number of analyses also point to the fact that the Price/Earning (P/E) ratios of the Pakistani companies do not seem to be excessive compared to P/E ratios for other emerging market companies. Besides, a high rate of inflation and a deteriorating currency value over the years contribute to the apparent rise in nominal value of the index which is denominated in the local currency. Figure 3 plots the dollar denominated Emerging Markets and Frontier Markets MSCI indices, and indeed in comparison, the KSE's does not appear to be excessively far off from the others, while still running higher.

Fig. 3. KSE Comparative Performance— US $ Denominated Indices



[2]ISAF—International Security Assistance Force.

Fig. 4. Comparative Growth Rates in GDP



Among the technical reasons possibly explaining this outcome, one focus has been the structure and methodology of the KSE100 Index. The index is constructed using the Market Capitalisation Method. Since the KSE capitalisation is concentrated in a handful of stocks, the Index is also dominated by a few stocks and sectors of economy and tends to reflect the performance of the companies with the highest capitalisation, inflating market performance as compared to the overall corporate sector and the economy [Iqbal (2008)]. The stock market lacks breadth as well as depth and liquidity; only 60 of its 569 listed companies trade regularly. The 10 largest stocks accounted for 74 percent of the total market capitalisation as of 9 July 2013. Trading of stocks is likewise highly concentrated. Free float is rather limited; an average of only 20 percent of the shares of the listed companies are available for trading, resulting in relatively low market liquidity. This feature coupled with a high turnover paints a picture of a highly speculative market. Thus, it is claimed that the KSE 100 Index does not represent the economy or the corporate sector. Therefore, other indices have been advocated as alternatives, such as the KSE-30, or the MSCI Pakistan Index. The former is based on only on the free-float of shares, rather than on the basis of paid-up capital and is adjusted for dividends and right shares (formally implemented from September 1, 2006 with base value of 10,000 points).The latter is designed to measure the performance of the large and mid-cap segments of the Pakistan market. With 12 constituents, the index covers approximately 85 percent of the Pakistan equity universe.

In this paper we document and analyse the behaviour of Pakistan's equity market for presence of speculative bubbles using established empirical methodologies. In order to address issues of inflation and foreign exchange, we construct a four-variable VAR model which includes in addition to the KSE100 index, foreign exchange rate against US dollar, and the interest rate series which would reflect the expected inflation.

THEORY OF SPECULATIVE BUBBLES

A speculative bubble involves an asset market dominated by agents purchasing an asset with the expectation that its price will rise in some near term future so that they can make a capital gain within a relatively near term period. This then leads the price to rise above the long run fundamental value, presumably based on the present value of a

rationally expected future stream of net real returns properly discounted. While there is a long and classic literature arguing for the historical existence of such bubbles going back centuries [Kindleberger (2000)], theoretical literature faces certain complications. The first is that it is difficult to reconcile such agent behaviour with the assumption of rationality. Indeed, Tirole (1982) argued that bubbles will not happen in a world of infinitely lived, perfectly informed rational agents, operating in discrete time markets. Due to the idea that the bubble must end at some point and it will not be rational to be holding the asset in the period before it ends, an assumption of common knowledge feeds a backward induction argument to show that it is irrational to become involved in the bubble to begin with.

However, rational bubbles may be possible as some of these assumptions are relaxed. Thus, Tirole (1985) showed that allowing finitely lived agents in overlapping generations models can pass a stationary bubble on to later generations, with this argument having been made for the long run existence of a stable fiat money (whose fundamental value is zero). But stationary bubbles are not empirically observable as most tests for bubbles (such as those we use below) involve seeking to observe apparently rapid movements away from presumed fundamentals. Such bubbles can be rational even if they are expected to crash in finite time but inflate at an accelerating rate that provides a risk premium for rational agents [Blanchard and Watson (1982)]. Such bubbles have been studied by various observers [Elwood, Ahmed, and Rosser (1999); Sornette and Zhou (2005)].

The standard approach would be to identify a bubble by

$$b(t) = p(t) - f(t) + \varepsilon(t) > 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where t is time period, b is bubble value, p is price, f is the fundamental value, and ε is an exogenous stochastic noise process, usually assumed to be i.i.d. or even Gaussian normal, even though many asset returns are known to exhibit higher moments than do Gaussian distributions, such as skewness and kurtosis ("fat tails"). This formulation leads us to the other major problem in the theory of bubbles, i.e., designing of a empirical tests for the presence of bubbles, namely how to tell what is the fundamental versus the bubble (or the stochastic noise process), with the price being the only item that is unequivocally identifiable. This has been labeled the misspecified fundamental problem by Flood and Garber (1980) who argue that it is impossible to econometrically identify for certain a fundamental, although Ahmed, *et al.* (1997) have argued that one can observe fundamentals in closed-end country funds in the form of net asset values, with premia above those clearly constituting bubbles. Any peculiar price movement that appears to deviate from a presumed fundamental may actually be a rationally expected fundamentals movement by agents, even if it proves *ex post* not to be justified. After all, rational expectations simply mean being right on average, not all the time; errors can be made. Beyond this argument there are some who argue that the concept of a fundamental is theoretically empty due to fundamental uncertainty [Davidson (2004)] or because high frequency price changes are all that matter [Bouchaud and Potters (2003)]. In any case, we must recognise for our study here that we are not fully able to overcome the misspecified fundamental critique, and therefore must garnish our conclusions with a strong caveat acknowledging that we are not definitely proving the existence of bubbles in the KSE market, even if the evidence is highly supportive.

Rejecting the idea of considering rational bubbles is the idea that they are inherently irrational, perhaps most eloquently expressed by the title of Robert Shiller's book *Irrational Exuberance* (2015). In this psychological view agents become overwhelmed by excitement over prospective short term gains and underestimate and misprice the risks that they are engaging in. Thus waves of optimism (or even "mania") alternate with pessimism (or "panic"), with Kindleberger supporting this view. The earlier work of Hyman Minsky (1972) is also in this line of argument, arguing that financing standards become relaxed during the boom phase of a speculative bubble helping to push it upwards.

In between the competing strands of the rational bubble literature is the view that there may be heterogeneous agents, some rational and some not. Earlier literature [Baumol (1957); Zeeman (1974)] recognised this and saw bubbles arising as the less rational trend chasers came to dominate an asset market, only to be chased out by the rational fundamentalists when the bubble would crash, and the balance going back and forth in any given market over time. This line of argument fell out of favour in the later 1970s and in the 1980s as the rational expectations revolution took hold, but with the apparent occurrences of bubbles and crashes in many markets, beginning with the US stock market crash of 1987, this belief weakened. The idea that some agents might not be rational was also argued by Black (1985), and DeLong, *et al.* (1991), who showed that the supposedly irrational "noise traders" might actually do better (or at least some of them) than the rational fundamentalists and thus survive, the argument that such traders would lose money and be driven out of the market long being used to dismiss their possible existence.

More recent theoretical study in which agents switch strategies over time is due to Föllmer, Horst, and Kirman (2005). Such an approach has also been studied using agent-based modeling of heterogeneous agents as has been done by Chiarella, *et al.* (2003), with Gallegati, Rosser, and Palestrini (2011) providing an example that can exhibit the phenomenon recognised by Minsky of a period of financial distress in a bubble, a period of gradually declining prices after a peak but prior to a full crash, which has been observed in many historical bubbles.

METHODOLOGY AND DATA

Following the initial approach of Canova and Ito (1991), we estimate our assumed fundamental value time series by estimating a Vector Autogressive (VAR) model using daily data for the KSE100 stock market index with daily data for world stock prices, the Pakistani foreign exchange rate, and the Pakistani middle 30-day Repo interest rate. It is from this VAR model (with 8 lags) that we then estimate residuals that we apply our various tests of possible bubbles and nonlinearity on.

The vector autoregression (VAR) is used to capture the linear interdependencies among multiple time series. A VAR model captures the evolution of a set of k endogenous variables over the sample period (t = 1, ..., T) as a linear function of only their past values. These variables are collected in a $k \times 1$ vector y_t, which has as the ith element, $y_{i,t}$, the observation at time "t" of the ith variable. A p-th order VAR, denoted VAR(p), is:

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

where the l-periods back observation y_{t-l} is the l-th lag of y, c is a $k\times1$ vector of constants, A_i is a time-invariant $k\times k$ matrix and ε_t is a $k\times1$ vector of error terms; contemporaneous covariance matrix of error terms is Ω, and there is no across time or serial correlation in the individual error terms. In our model the four variables are as described above, KSE100 returns, short-term interest rates, the PKR/USD exchange rate and the MSCI World stock index. The lag-length of eight was found to be econometrically appropriate following usual criteria (*SIC, BIC*). Examination of the residuals (see Table 5) shows that the model residuals are well-behaved.

As noted above, this is subject to the difficult-to-avoid misspecified fundamental problem. We hope to capture expectations of discounted future streams of net returns for the stock market. Some of the variables we use clearly affect this, most obviously the interest rate one. We are constrained by the fact that more specific and frequent estimates of the market fundamentals are just not available. Using GDP itself is also not useful given that it does not remotely vary on a daily basis. We presume that the exchange rates, interest rates and the world market index would reflect expectations of the market regarding the economic and stock expected cash flows. The world stock market index provides some estimate of expectations about future global economic performance, which should influence future Pakistani economic performance. The Pakistani foreign exchange rate should provide some information regarding expectations of future Pakistani performance relative to global performance. The interest rate provides information regarding both expected future performance as well as the discount rate for future returns.

Before proceeding further we note that it might be worthwhile to test our method against other econometric ones derived from the set of theoretical models of bubbles listed above, as well as others not discussed. However, we note that there is a vast array of such methods and such a project would be a different paper rather than the one we are engaged in here examining the Karachi stock market in particular. As it is there have been some studies attempting to survey the wide variety of such techniques, including Gurkayanak (2008) and Homm and Breitung (2012). We take some comfort in the finding in this latter study that tests involving structural breaks have "the highest power," and our use of regime switching tests fits into this category.

EMPIRICAL TESTS FOR SPECULATIVE BUBBLES

This section describes the three empirical tests employed in the study. These are: (i) Regime Switching Test, (ii) Hurst Persistence Test, and (ii) Nonlinearity Test.

(i) Regime Switching Test

Hamilton (1989) introduced an approach to regime switching tests that can be used to test for trends in time series and switches in trends, as used in Engel and Hamilton (1990) and van Norden and Schaller (1993). We use this approach as our main test for the null of no bubbles on the residual series derived above which is given by

$$\in_t = n_t + z_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

where

$$n_t = \mu_1 + \mu_2 s_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

and

$$z_t - z_{t-1} = \phi(z_{t-1} - z_{t-2}) + \ldots + \phi(z_2 - z_1) + \varepsilon_1 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

with ϕ an autoregressive function.

with $s = 1$ being a positive trend, $s = 0$ being a negative trend, and $\mu_1 \neq 0$ indicating the possible existence of a trend element beyond the VAR process. Furthermore, let:

$$Prob\ [s_t = 1 \ \ s_{t-1} = 1] = p,\ Prob\ [s_t = 0 \ \ s_{t-1} = 1] = 1 - p \quad \ldots. \quad \ldots \quad (6)$$

$$Prob\ [s_t = 0 \ \ s_{t-1} = 0] = q,\ Prob\ [s_t = 1 \ \ s_{t-1} = 0] = 1 - q. \quad \ldots \quad \ldots \quad (7)$$

Following Engel and Hamilton (1990) a "no bubbles" test proposes a null hypothesis of no trends given by $p = 1 - q$. This is tested by with a Wald test statistic given by

$$[p - (1 - q)]/[\text{var}(p) + \text{var}(1 - q) + \text{covar}(p, 1 - q)]. \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

(ii) Hurst Persistence Tests

Hurst (1951) developed a test to study persistence of Nile River annual flows, which was first applied to economic data by Mandelbrot (1972). This technique is also known as *rescaled range analysis*. For a series x_t with n observations, mean of x^*m and a max and a min value, the range $R(n)$ is:

$$R(n) = [\max 1 \leq k \leq n \sum_{j=1}^{k} (x_j - x^*) - \min 1 \leq k \leq n \sum_{j=1}^{k} (x_j - x^*)] \quad \ldots \quad (9)$$

The scale factor, $S(n, q)$ is the square root of a consistent estimator for spectral density at frequency zero, with $q < n$,

$$S(n,q)^2 = g_0 + 2\sum_{j=1}^{q} w_j(q) g_j, w_j(q) = 1 - [\tfrac{j}{q-1}] \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

with g's autocovariances and w's weights based on the truncation parameter, q, which is a period of short-term dependence. Lo (1991) has criticised the used of the classical Hurst coefficient for studying long-term persistence due to this presence of short-term dependence in it, but this is not a problem for us. The classical Hurst case has $q = 0$, which reduces the scaling factor to a simple standard deviation.

Feller (1951) showed that if x_t is a Gaussian i.i.d. series then

$$R(n)/S(n) \propto n^H, \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

with $H = 1/2$, which implies integer integro-differentiation and thus standard Brownian motion, the "random walk." H is the Hurst coefficient, which can vary from zero to one with a value of 1/2 implying no persistence in a process, a value significantly less than 1/2 implying "anti-persistence" and a value significantly greater than 1/2 implying positive persistence. The significance test involves breaking the sample into sub-samples (namely, pre-bubble, during-bubble and post-bubble period) and then estimating a Chow test on the null that the sub-periods possess identical slopes.

(iii) Nonlinearity Test

We test for nonlinearity of the VAR residual series in two stages. The first is to remove ARCH effects. Engle (1982) the nonlinear variance dependence measure of autoregressive conditional heteroskedasticity (ARCH) as

$$X_t = \delta_t \mu_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (12)$$

$$\delta_t^2 = \alpha_0 + \sum_{i=0}^{n} \alpha_i X_{l-i}^2 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (13)$$

with μ is i.i.d. and the α_I's different lags. We use a three period lag and, as expected, significant ARCH effects in all series, available on request from the authors.

The second stage involves removing variability attributable to the estimated ARCH effects from the VAR residual series for both models. The remaining residual series is run through the BDS (Brock-Dechert-Scheinkman) test due to Brock, Dechert, LeBaron, and Scheinkman (1997), with useful guidance on certain aspects in Brock, Hsieh, and LeBaron (1991). This statistic tests for generalised nonlinear structure but does not test for any specific form such as alternative ARCH forms or chaos.

The correlation integral for a data series x_t, t = 1, …, T results from forming m-histories such that $x = [x_t, x_{t+1}, \ldots, x_{t+m+1}]$ for any embedding dimension m. It is

$$c_m T(\varepsilon) = \sum_{t<s} I_\varepsilon (X_t^m, X_s^m) \left[\frac{2}{T_m(T_m-1)}\right] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (14)$$

with a tolerance distance of ε, conventionally measured by the standard deviation divided by the spread of the data, $I_\varepsilon(x_t^m, x_s^m)$ is an indicator function equaling 1 if $|ix_t^m - x_s^m I| < \varepsilon$ and equaling zero otherwise, and $T_m = T - (m - 1)$.

The BDS statistic comes from the correlation integral as

$$BDS\ (m, \varepsilon) = T^{1/2}\{c_m(\varepsilon) - [c_1(\varepsilon)]^m\}/b_m \quad \ldots \quad \ldots \quad \ldots \quad (15)$$

where b_m is the standard deviation of the BDS statistic dependent on the embedding dimension m. The null hypothesis is that the series is i.i.d., meaning that for a given ε and an $m > 1$, $c_m(\varepsilon) - [c_1(\varepsilon)]^m$ equals zero. Thus, sufficiently large values of the BDS statistic indicate nonlinear structure in the remaining series. This test is subject to severe small sample bias with a cutoff of 500 observations sufficient to overcome this, a minimum both of our daily series easily achieve.

Results

The results of the empirical tests are reported in Tables 2–5 and are summarised below.

(i) *Regime Switching Test:* Results are reported in Table 2. The critical value for rejecting the null of no trends is $\chi^2 = 3.84$. Clearly, the null of no trends is strongly rejected, given the reported value of 4076.68 for the test.

(ii) *Hurst Persistence Test:* Table 3 presents the results of this test, for which the critical *F*-value for the Chow test is 6.4. Table 3 consists of four sub-tables. The first, 3A, is for the entire sample period. The remaining three are for sub-periods, with 3B for the period of steep decline between April 18, 2008 and January 26, 2009, with 3C being for a sub-period prior to that between

February 1992 and December 2001, while 3D is for the period from January 2001 to November 2013. These break the sample approximately between the period before the regional effects of the U.S. reaction to the 9/11 attacks happened and after they started happening. For all of these cases, the estimated *F*-values easily exceed the critical value. Thus, the Hurst persistence test for both the entire sample as well as the three sub-samples significantly rejects the null of a value of 0.50, which would indicate no persistence.

Again, we emphasise that the validity of these tests are subject to the caveat that we have estimated reasonably well the fundamental series for the asset time series process.

(iii) *Nonlinearity Test:* Table 4 present the results of this test for embedding dimensions, m = 2 to 4 (m = 3 is conventional). The critical value for rejecting the null of i.i.d. ranges from 4.70 to 6.92 for those three cases. Based on the estimated BDS statistics null is rejected as these estimated numbers range from 24.87 to 32.81. Thus, there appears to be remaining nonlinearity beyond basic ARCH in the VAR residual series.

Of course, just as our earlier tests are subject to the validity of our original VAR specifications and the broader misspecified fundamental problem, likewise so is this test, which is further limited by our modification of the basic result with a basic ARCH adaptation. Thus, we also emphasise that the nature of the remaining nonlinearity remains unknown.

Table 2

Wald Test Results on Residuals from the VAR Model
VAR Variables: (i) KSE100 Index Returns, (ii) Exchange Rate, (iii) Pakistan Repo 30 Day Middle Rate, and (iv) World Stock Index

Sample Period	H_0: P_1=1-P_2
February 28, 1992-November 25, 2013	4076.68

Critical Value $\chi^2(1)$=3.84

Table 3

Hurst Coefficients and Related Chow Tests
Hurst Coefficients and Chow Test Results on Residuals from Four-Variable VAR Model of Pakistani Stock Returns, Exchange Rate, Pakistan Repo 30 Day Middle Rate and World Stock Index

	Hurst Coefficient	Computed F
Table 3a		
Full Sample Period February 28, 1992-November 25, 2013	0.59	1569*
Table 3b		
Sample Period April 18, 2008-January 26, 2009	0.83	920*
Market Peaked and Crashed in April 2008. Hit through January 2009		
Table 3C		
Sample Period February 1992-December 2001	0.63	4398*
Table 3D		
Sample Period January 2002-November 2013	0.59	2911*

*Computed Value of F>Critical Value of F 4.31; Reject the hypothesis of no persistence in the entire sample. We reject the hypothesis that this selected sample is the same full sample.

Table 4

BDS/SD Results
Sample Period February 28, 1992-November 25, 2013

No. of Dimensions	No. of Observations	BDS/SD Results
2	5673	24.87
3	5673	28.84
4	5673	32.81

Critical Value (for sample >1000, with m2) is approximately 4.70-6.92.

Table 5

ARCH Test Based on Residuals from VAR Procedure
Dependent Variable: RESID01; Method: ML – ARCH
Sample (adjusted): 2/28/1992 11/25/2013; Included observations: 5672
Convergence achieved after 64 iterations. Coefficient covariance computed using outer product of gradients; Pre-sample variance: back-cast (parameter = 0.7)
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*RESID(-2)^2 + C(5)*RESID(-3)^2 + C(6)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000276	0.000145	1.900344	0.0574
	Variance Equation			
C	4.29E-06	3.59E-07	11.9715	0.0000
RESID(-1)^2	0.1756	0.01256	13.9730	0.0000
RESID(-2)^2	–0.0099	0.0182	–0.5454	0.5855
RESID(-3)^2	–0.0638	0.0146	–4.3673	0.0000
GARCH(-1)	0.8819	0.0063	139.7810	0.0000
Adjusted R-squared	–0.0003	Akaike info criterion		–5.8968
Log Likelihood	16729.27	Schwarz criterion		–5.8898
Durbin-Watson stat	2.0006	Hannan-Quinn criterion		–5.8943

CONCLUSIONS

We have tested daily data for the Karachi stock exchange since 1992, including some appropriate sub-period tests, and reject the hypothesis of the absence of bubbles in the market, and also of nonlinearities beyond ARCH. We did this by estimating a hypothesised fundamental value time series for daily data from a Vector Autoregressive (VAR) model with daily data on the stock market world stock market prices, the Pakistani foreign exchange rate, and the middle 30-day Repo interest rate. Residuals from this VAR were tested for divergence using Hamilton regime switching tests and Hurst rescaled range statistics, with nonlinearity beyond ARCH being tested for using BDS statistics.

While we have not specifically compared the KSE to other emerging and frontier markets with our tests, available data suggests that indeed this market has exhibited greater volatility than most others, certainly more so than the average performance of such markets. While this performance may be partly due to technical issues, particularly

regarding the measurement of the KSE index, it would be unwise to argue that such factors fully explain this. The KSE market simply appears to be highly volatile.

Such volatility makes it harder to sustain long-term investment for growth in the Pakistani economy. Indeed, one of the reasons to believe that speculative behaviour is a major factor in the market's high volatility is that the market's recent rise seems to be much greater relative to its GDP growth than one observes in other emerging and frontier economies. It is unclear what the best policy to deal with this problem is. Engaging in excessively strict monetary policy risks dragging down an economy that is already not growing as rapidly as many would like and is a blunt instrument for such a policy anyway [Rosser, Rosser, and Gallegati (2012)]. There is also recent evidence that monetary policy may well have a surprisingly weak influence on stock market bubbles [Galí and Gambetti (2015)]. Other policies that might be used might include tighter regulation of margin requirements and other more specific actions directed at micro details of the functioning of the markets. Of course, the fact that Pakistan faces serious problems due to terrorism and warfare in its region underscore the difficulty of making economic policy more generally in the nation.

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55:2 (Summer 2016) pp. 95–111

The Nexus of Foreign Direct Investment, Economic Growth and Environment in Pakistan

SYED SUNDUS RAZA and ANWAR HUSSAIN

This paper estimate the impact of sectoral FDI on economic growth and carbon dioxide emissions in Pakistan. To this end, it uses time series secondary data from 1972 to 2011 and applies Auto Regressive Distributed Lag (ARDL) models. The results showed that FDI inflows in manufacturing, transport, storage and communication sectors and energy consumption have positive effect on the GDP growth of Pakistan. Besides, FDI inflow in manufacturing, transport, storage and communication sector and population density are responsible for the CO_2 emissions in Pakistan. The results also validate Environmental Kuznet Curves in both long and short run.

JEL Classification: E2, O4, Q5
Keywords: Sectoral FDI, CO_2 emissions, Environmental Kuznet Curves, Gross Domestic Product Growth

1. INTRODUCTION

The growing concern for sustainable development diverted the world concentration from conventional growth to environmentally affable growth [Nasir and Rehman (2011)]. Environmental degradation has affected the economic activities in serious manner. This increase in environmental degradation is fueled by multi factors including the increasing trend of foreign direct investment [Mabey and McNally (1999)].

Foreign firms target developing countries that have low environmental standards, which attract investment in polluting sectors leading to "pollution heaven hypothesis"[1] [Chakraborty and Mukerjee (2010)]. Foreign firms choose to operate in developing countries in order to gain benefit from low cost of production which in turn effect environment negatively leading to "industrial flight hypothesis."[2] But not all the FDI inflow is bad for environment in developing world sometime it can be beneficial in form of "pollution holes hypothesis."[3] This means that even if we refuse these hypotheses

Syed Sundus Raza <sundasmanzar@gmail.com> is Visiting Faculty, Fatima Jinnah Women University, Rawalpindi. Anwar Hussain <anwar@pide.org.pk> is Assistant Professor, Pakistan Institute of Development Economics, Islamabad.

[1]Companies move their official operations to less developed economies to take benefit of weak environmental laws or developing countries may put a low price on their environment to make new foreign investment much attractive, which leads to over use of natural resources and environmental degradation [Mabey and McNally (1999)].

[2]Companies move their operations to developing economies to take advantage of lower cost of production [Shahbaz, *et al.* (2011)].

[3]The foreign firms may use better management and advance technology that can result in clean environment in host country [Shahbaz, *et al.* (2011)].

there is considerable amount of environmental damage associated with FDI [Shahbaz, *et al.* (2011)].

When foreign investment and trade amplify, it leads to extend the net of economic activities. The increased level of economic activities result in environmental degradation, which leads to scale effect.[4] The emissions of CO_2 can be decreased by the use of environmental friendly technology imported by foreign investors, so the international investment and trade can lead to the environment friendly production, as the competition increase the domestic producer also try to focus on production and decrease per unit cost. This leads to technique effect.[5] The FDI can also alter the industrial configuration of the economy leading to composition effect[6] [Grossman and Krueger (1991)].

The FDI stimulates the domestic investment, human capital formation, facilitate the technology transfer. Hence, the foreign direct investment is considered as growth enhancing factor in developing countries [Acharyya (2009); Falki (2009) and Asghar, *et al*. (2011)]. FDI inflows have helped in boosting the economic growth through structural makeover of the economy of Pakistan. It also helped in initiating the industrial sector as well as lying foundations for agricultural sector, supplied modern technology and technical support [Din (2007)].

There is inverted "U" shape relationship between environmental degradation and economic growth, when economic growth increases, income also increases which affect the environment negatively. As a result of increased growth, the economy expands and income rises. At high level of income people are more conscious about environment so they demand to maintain clean environment. This relationship is called as "Environmental Kuznets Curves" (EKC) [Grossman and Krueger (1991)]. The same idea is also supported by Seldon and Song (1994).

Different sectors have different effects on the economic growth [Alfaro (2003)]. The type of FDI and sector in which it is going is very important from both environmental degradation and economic growth point of view. In this paper Carbon dioxide emissions are used as variable representing environmental degradation and GDP to represent economic growth. The FDI affect both environment and the economic growth. To test the Environmental Kuznets Curve (EKC), many researchers have used Carbon dioxide emissions as indicator for environmental quality.

There is very little work done on the sector specific FDI, economic growth and environmental degradation. Therefore, this paper contributes to empirically check the effect of sector specific FDI on economic growth and environment followed by checking the existence of EKC in Pakistan. For the analysis three sectors have been selected namely, manufacturing sector, mining and quarrying sector and transport, storage and communication sectors. Only those sectors are selected that have high actual emissions (emission per unit of output).

In the past researchers tried to relate FDI with other economic variables. Besides, they highlighted various influencing factors of economic growth. Falki (2009) examines

[4]When trade cause the expansion of economic activity thus trend to increase pollution [Dietzenbacher and Mukhopadhyay (2007)].

[5]Trade can induce technological spillovers that can lead to the adoption of ''cleaner'' production techniques by host countries [Dietzenbacher and Mukhopadhyay (2007)].

[6]It is the change in the share of dirty goods in GDP, because of a price change favouring their production [Acharrya (2009)].

the effect of total FDI on economic growth of Pakistan. The sector of economy in which FDI is coming is very important with relationship to economic growth. The outcomes in terms of economic growth can vary from sector to sector and can be misleading if total FDI is used [Wang (2009)]. Studies by Alfaro (2003); Ganges, *et al.* (2006); Chakraborty and Nunnenekamp (2007) and Wang (2009)] found out that manufacturing sector contribute positively towards economic growth, whereas there are insignificant contribution of primary sector and ambiguous contribution of services sector towards economic growth. Labour force and FDI have an important interaction and labour force play an important role in the absorption of FDI [Borenztein, *et al.* (1998)]. Energy consumption is a vital determinant of economic growth as it is considered as an engine of economic progress [Lee and Chang (2008)]. Economic growth and environmental degradation is the area of concern from early1990s, FDI tends to increase the level of economic activity which a leads to environmental degradation [Pao and Tsai (2010); Zhang, *et al.* (2011); Merican, *et al.* (2007) and Mulali (2012)]. Environmental degradation is also related to population density and the increase in population density trends to increase environmental degradation [Shi (2003)].

For understanding the costs and benefits of FDI in terms of economic growth and environmental degradation, it is critical to study their nexus. The studies of Baek and Kon (2008); Acharyya (2009) and Honglei, *et al.* (2011) are worth mentioning who explored the presence of "Pollution Heaven Hypothesis" and EKC's. The relationship between the economic growth and environmental degradation was first floated by Grossman and Krueger (1991) followed by Selden and Song (1994). Different studies on EKC's have been included in this regard are Lindmark (2002); Fodhaa and Zaghdoud (2011); Nasir and Rehman (2011); Shahbaz, *et al.* (2011) and Hitam and Borhan (2012). The studies regarding EKC's use different indicators for environmental degradation like CO_2 and SO_2. Nasir and Rehman (2011) and Shahbaz, *et al.* (2011), explored the validity of EKC for Pakistan but with the nexus of energy consumption, economic growth and total FDI.

2. THEORETICAL BACKGROUND

2.1. FDI Inflow and Carbon Dioxide Emissions Model

According to Dasgupta, *et al.* (2002) "The environmental Kuznets curve posits an inverted-U relationship between environmental degradation and economic development. Kuznets' name was apparently attached to the curve by Grossman and Krueger (1991), who noted its resemblance to Kuznets's inverted-U relationship between income inequality and development." The relationship between environmental degradation and economic growth can be expressed as:

$$Z_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 Y_t^2 + e_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where Z_t can be any variable which represent environmental degradation and Y_t can be any variable which represent economic growth. The linear and nonlinear terms of economic growth are added in order to check the validity of EKC. Theoretically if the coefficients of Y are positive and that of Y^2 is negative; it validates the existence of the EKC hypothesis [Shahbaz, *et al.* (2011)].

To check the impact of sectoral FDI on Carbon dioxide emission, the additional variables namely FDI in manufacturing, FDI in mining and quarrying, FDI in transport, storage and communication sector are added to the model. The population density is added to the existing model because population density is related to Carbon dioxide emissions [Shi (2003)]. The final model is as follows:

$$mt_t = f\ (g_t, g_t^2, man_t, mn_t, tr_t, pd_t, D, e_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Where

mt_t is Carbon dioxide emissions in year t measured in metric ton per capita.
g_t is Real GDP per capita in year t and measured in million rupees.
g_t^2 is square term of real GDP per capita in year t and measured in million rupees.
man_t is FDI inflow in manufacturing sector in year t measured in million rupees.
mn_t is FDI inflow in mining and quarrying sector in year t measured in million rupees.
tr_t is FDI inflow in transport, storage and communication sector in year t measured in million rupees.
pd_t is population density in year t measured in per square km of land area.

Whereas D is dummy variable which represent structural breaks namely in year (1994, 2000, 2005, 2007, 2008, and 2009) in sectoral FDI data. e_t is error term.

2.2. FDI Inflow and GDP Growth Model

The neoclassical economist gave the theory of output (production) function as follows;

$$Y = Af\ (K, L) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Equation 3 represents Cobb Douglas production function where K represents capital and L represents Labour. Energy variable was first added to the economic theory by Roegen (1975). Then Kraft and Kraft (1978) was first to use energy consumption variables in production function. Further FDI is used in sectoral form in this study because different sectors have different effects on economic growth. Borensztein, *et al*. (1998) stressed on the importance of human capital because it plays very important role in the absorption of foreign direct investment, this is the reason for the inclusion of labour force in the model.

The model is as follows

$$GDP_t = f\ (man_t, mn_t, tr_t, lab_t, ene_t, D, e_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Where;

GDP_t is gross domestic product in year t measured in million rupees.
man_t is FDI inflow in manufacturing sector in year t and measured in million rupees.
mn_t is FDI inflow in mining and quarrying sector in year t measured in million rupees.
tr_t is FDI inflow in transport, storage and communication in year t measured in million rupees.

ene_t is energy consumption in year t measured in million metric tons of oil equivalent.

lab_t is labour force in year t measured in millions.

Whereas D is dummy variable which represent structural breaks namely in year (1994, 2000, 2005, 2007, 2008, and 2009) in sectoral FDI data. e_t is error term.

3. DATA AND METHODOLOGY

3.1. Data and Sources

The data used in this study is time series from1972 to 2011. Data on per capita CO_2 emissions, population density is obtained from World Development Indicators (WDI). The data for the energy consumption is taken from Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC). While the data for the labour force, real per capita GDP, real GDP and sectoral FDI is taken from State Bank of Pakistan (SBP).

3.2. Methodology

3.2.1. *Test of Stationarity*

Augmented Dickey Fuller (ADF) test is widely used to identify the order of integration I(d) of variables. The general form of Augmented Dickey Fuller test is

$$\Delta X_t = \alpha + \beta t + \varphi X_{t-1} + \theta_1 \Delta X_{t-1} + \theta_2 \Delta X_{t-2} \ldots\ldots\ldots \theta_p \Delta X_{t-p} + \varepsilon_t \quad \ldots \quad \ldots \quad (5)$$

Where, X_t denotes the time series variable to be tested, used in model. t is time period, Δ is first difference and φ is root of equation. βt is deterministic time trend of the series and α denotes intercept. The numbers of augmented lags (p) determined by the dropping the last lag until we get significant lag. The Augmented Dickey Fuller unit root concept is illustrated through equation $\Delta X_t = (\rho - 1) X_{t-1} + \varepsilon_t$, Where, $(\rho - 1)$ can be equal to φ, if $\rho = 1$ so series has the unit root, so root of equation is $\varphi = 0$.

3.2.2. *Test of Cointegration*

For finding the cointegration among the variables, Pesaran, *et al.* (2001) has proposed bound test through ARDL approach to test the co-integration. Through ARDL bound testing approach, the long run and short run dynamic association between the variables can be estimated at a same time by estimating the unrestricted error correction model (UECM).

Following is the general form of ADRL model of co-integration or UECM;

$$\Delta Y = c + \beta t + \lambda_y Y_{t-1} + \varphi_x X_{t-1} + \sum_{i=1}^{n} \gamma \Delta Y_{t-i} + \sum_{i=0}^{n} \delta \Delta x_{t-i} + u_t \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

Where; Y is dependent variable and X is vector of independent variables, Pesaran, *et al.* (2001). Following two hypotheses will be tested to check the co-integration between variables. u_t is normally distributed with zero mean and constant variance $(0, \sigma^2)$. We have applied the restrictions on Equation 6 to check the following hypotheses.

H_0^1: $\varphi_x X_{t-1} = 0$ ($\varphi_x X_{t-1}$ is of lag of independent variables equal to zero)

H_0^2: $\lambda_y Y_{t-1}=0$ ($\lambda_y Y_{t-1}$ dependent variable lag equals to zero)
H_0: $H_0^1 \cap H_0^2$
H_a: $H_0^1 \cup H_0^2$

We check H_0^1 and H_0^2 jointly. First to check the co-integration joint hypothesis; H_0 is tested through *F*-statistics, by comparing with critical values of *F* for bound test [Pesaran, *et al.* (2001)]. There are two bound for each level of significance, I (1) upper bound and I (0) lower bound. If *F*-statistics lies outside the upper bound I (1), the null of hypotheses is rejected. If it lies below the lower bound I (0), the null hypothesis cannot be rejected and if it lies between the two bound then results are inconclusive.

In next step log run estimates can be calculated from UECM by normalising the variables.

$$Y_t = c+\beta t+ \varphi_x X_{t-1}+ \mu_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

Where; c is constant and βt is trend. $\varphi_x X_{t-1}$ is vector of independent variables. Finally, short run dynamics are estimated from the UECM as follows;

$$\Delta Y = c + \beta t+\sum_{i=1}^{n} \gamma \Delta Y_{t-1} +\sum_{i=0}^{n} \delta \Delta x_{t-1}+ECT_{t-1} + u_t \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

So finally UECM for FDI inflows and CO_2 can be estimated as follows:

$$\begin{aligned}\Delta mt_t = {} & a_0 + \beta t+a_1 mt_{t-1}+ a_2 g_{t-1} + a_3 g^2_{t-1} + a_4 man_{t-1} + a_5 mn_{t-1} + a_6 tr_{t-1} + a_7 pd_{t-1} + \\ & \sum_{i=1}^{n} \delta_1 \Delta mt_{t-i}+\sum_{i=0}^{n} \delta_2 \Delta g_{t-i}+\sum_{i=0}^{n} \delta_3 \Delta g^2_{t-i}+\sum_{i=0}^{n} \delta_4 \Delta man_{t-i}+\sum_{i=0}^{n} \delta_5 \Delta mn_{t-i} \\ & +\sum_{i=0}^{n} \delta_6 \Delta tr_{t-i} +\sum_{i=0}^{n} \delta_7 \Delta pd_{t-i} + \sum_{i=1}^{n} \omega D_i + \mu_t \quad \ldots \quad \ldots \quad \ldots \quad (9)\end{aligned}$$

a_0 and β are the intercept and trend respectively. Whereas a_1 to a_7 are the long run coefficients and δ_1 to δ_7 are short run coefficients. ω is the coefficient of dummy variable and μ_t error term.

UECM for FDI inflows and GDP growth can be estimated as follows:

$$\begin{aligned}\Delta GDP_t = {} & a_0 + \beta t+a_1 GDP_{t-1}+ a_2 man_{t-1} + a_3 mn_{t-1} + a_4 tr_{t-1} + a_5 lab_{t-1} + a_6 ene_{t-1} + \\ & \sum_{i=1}^{n} \delta_1 \Delta GDP_{t-i}+\sum_{i=0}^{n} \delta_2 \Delta man_{t-i}+\sum_{i=0}^{n} \delta_3 \Delta mn_{t-i}+\sum_{i=0}^{n} \delta_4 \Delta tr_{t-i} + \\ & \sum_{i=0}^{n} \delta_5 \Delta lab_{t-i}+ \sum_{i=0}^{n} \delta_6 \Delta ene_{t-i}+\sum_{i=1}^{n} \omega D_i + \mu_t \quad \ldots \quad \ldots \quad (10)\end{aligned}$$

a_0 and β are the intercept and trend respectively. Whereas a_1 to a_6 are the long run coefficients and δ_1 to δ_7 are short run coefficient. ω Coefficient of dummy variable and μ_t error term.

3.3. Bound Test Procedure

The first step in the ARDL bounds testing approach is to estimate Equation (9 and 10) by ordinary least squares (OLS) in order to test for the existence of a long-run relationship among the variables by conducting an *F*-test for the joint significance of the coefficients of the lagged levels of the variables, i.e., H_0: $\delta_1= \delta_2= \delta_3= \delta_4= \delta_5= 0$ against the alternative H_1 : $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$. We denote the test which normalise on *mt* by F_{mt} (*mt/c,t, g, g*^{2}, *man, mn, tr, pd*) and normalised on GDP by F_{GDP} (*GDP/c, t, man, mn, lab, ene*) for second model. A symptotic critical values bounds provide a test for co-integration when the independent variables are I(d) (where $0 \leq d \leq 1$): a lower value assuming the regressors are I(0) and an upper value assuming purely I(1) regressors. If the *F*-statistic

is above the upper critical value, the null hypothesis of no long-run relationship is rejected. Conversely, if the test statistic falls below the lower critical value, the null hypothesis cannot be rejected. Finally, if the statistic falls between the lower and upper critical values, the result *b* inconclusive.

In the second step, once co-integration is established the conditional *ARDL* (p_1, q_1, q_2, q_3, q_4) long model for the dependent variable is estimated. The long run model of FDI inflow and CO_2 emission is as follows:

$$\Delta mt_t = a_0 + \beta_t + a_1 mt_{t-1} + a_2 g_{t-1} + a_3 g^2_{t-1} + a_4 man_{t-1} + a_5 mn_{t-1} + a_6 tr_{t-1} + a_7 pd_{t-1} + \omega D_t + \mu_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

Long run model of FDI inflow and GDP growth is as follows:

$$\Delta GDP_t = a_0 + \beta t + a_1\, GDP_{t-1} + a_2\, man_{t-1} + a_3 mn_{t-1} + a_4 tr_{t-1} + a_5 lab_{t-1} + a_6 ene_{t-1} + \omega D_t + \mu_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (12)$$

Short run dynamics of FDI inflows and Carbon dioxide emissions is as follows:

$$\Delta mt = \sum_{i=0}^{n} \delta_2 \Delta g_{t-i} + \sum_{i=0}^{n} \delta_3 \Delta g^2_{t-i} + \sum_{i=0}^{n} \delta_4 \Delta man_{t-i} + \sum_{i=0}^{n} \delta_5 \Delta mn_{t-i} + \sum_{i=0}^{n} \delta_6 \Delta tr_{t-i} + \sum_{i=0}^{n} \delta_7 \Delta pd_{t-i} + ECT_{t-1} + \sum_{i=1}^{n} \omega D_i + \mu_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (13)$$

Short run dynamics of FDI inflow and economic growth is as follows:

$$\Delta GDP = \sum_{i=0}^{n} \delta_2 \Delta man_{t-i} + \sum_{i=0}^{n} \delta_3 \Delta mn_{t-i} + \sum_{i=0}^{n} \delta_4 \Delta tr_{t-i} + \sum_{i=0}^{n} \delta_5 \Delta lab_{t-i} + \sum_{i=0}^{n} \delta_6 \Delta ene_{t-i} + ECT_{t-1} \sum_{i=1}^{n} \omega D_i + \mu_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (14)$$

4. RESULTS AND DISCUSSION

It can be seen from Table 1 that FDI in manufacturing sector (man), FDI in mining and quarrying sector (mn) and population density (pd) are stationary at level whereas Carbon dioxide emissions (mt), Gross Domestic Product (GDP), real GDP per capita (g), Square of GDP per capita(g^2), FDI in transport, storage and communication (tr), Energy consumption (ene) and labour force (lab) are stationary at first difference. The results explores that the order of differencing of these variables are not the same, so ARDL model is appropriate to use.

Table 1

Stationarity Results of the Study Variables

Variables	ADF Test Statistics		Order of Integration I(d)
	Level	First Difference	
Mt	–3.02	–7.94***	I(1)
GDP	–1.06	–3.93**	I(1)
G	–2.15	–4.27***	I(1)
g^2	–1.55	–3.90***	I(1)
Tr	2.80	–12.76***	I(1)
Man	–4.16***	–3.21	I(0)
Mn	–3.46**	–2.91	I(0)
Pd	–3.84***	–2.91	I(0)
Ene	–2.63	–5.16***	I(1)
Lab	0.02	–6.57***	I(1)

Note: *,**,*** 10 percent, 5 percent and 1 percent level of significance respectively. Both trend and intercept are included in checking stationarity except for "pd" where only intercept is taken.

4.1. ARDL Model for FDI Inflow and Carbon Dioxide

First the UECM is estimated that contains Carbon dioxide emissions per capita as dependent variable as shown in Table 2. The estimated UECM is given below which includes long run as well as short run coefficients. This is parsimonious form of equation, from which insignificant terms are deleted. The outcome of test depends on the lag selection that is p=1, selected on the basis of AIC (Akaike criterion). In the model dummy variables are also included to check the impact of structural breaks in data. The significant dummies were in year 2007 and 2008. The year 2007 dummy represent structural break in FDI inflow in transport, storage and communication sector. The year 2008 dummy show structural break in FDI inflow manufacturing sector. Both dummies are significant. As stated by the Board of Investment Pakistan, Foreign direct investment inflow in the country was at 485 million dollars during 2001-02, following which there was a rise in FDI inflow in the country for the subsequent six years. The FDI inflow spiked in the year 2007-08, attaining a massive level of 5409 million dollars. After that, there was a gradual fall till 2011-12 level. If the spike through 2007-08 is taken as a point of reference among 2001 and 2012, 10–15 percent increase was recorded till 2007-08, after that there was a decline of 89 percent till 2011-12. One of the reasons was the democratic government in Pakistan which gained foreign confidence and engrossed foreign direct investment in Pakistan. Secondly the democratic government failed to solve the problems of the energy sector. Energy crisis has increased in the past three years. Continuous power cut downs and riots took place in Pakistan, specifically at

Table 2

Results of UECM for the Impact of FDI Inflow on Carbon Dioxide Emissions

Dependent Variable = Δmt (Metric Ton Per Capita)			
	Coefficient	t-stat	P values
Constant	–1.05	–4.35	0.00
mt_{t-1}	–0.78	–6.89	0.00
g_{t-1}	–56.17	–5.83	0.00
g^2_{t-1}	268.9	2.54	0.01
mn_{t-1}	–0.000919	–1.53	0.13
man_{t-1}	–0.000785	–2.08	0.04
tr_{t-1}	–0.000866	–2.44	0.00
pd_{t-1}	–0.011	–4.00	0.00
Δmt_{t-1}	0.43	2.59	0.01
Δg	19.6	3.27	0.00
Δg^2_{t-1}	–461.04	–2.83	0.00
Δtr	0.00517	2.08	0.04
Δman_{t-1}	0.0078	3.75	0.00
Δpd	0.10	3.77	0.00
Δpd_{t-1}	0.0887	3.87	0.00
D_{2007}	0.150	2.01	0.05
D_{2008}	0.059	3.89	0.00
Breusch-Godfrey Serial Correlation LM Test, F-statistics	0.02 (0.86)		
R-square	0.70		

Punjab. This situation influenced all economic sectors from manufacturing sector to transport sector, where FDI inflow was concentrated. After estimating the UECM, long run relationship has been checked, through testing the hypothesis that $H0{:}\beta=a_2=a_3=a_4=a_5=a_6=a_7=a_8=0$ by applying the F-test on lagged variables and comparing its values with the critical bound values provided by Pesaran, *et al*. (2001). The F calculated F =12.8. As there are k = 6, the F_{III} (unrestricted intercept and no trend) has critical values of upper I (1) and lower bound I (0) that are (2.45 3.61), so calculated F is greater than the upper bound critical value.

4.1.1. *Normalisd Long Run Estimates*

In the next step, long run equation is estimated whose coefficients are estimated by normalising it on dependent variable (mt). The normalised long run estimates are given in Table 3 which shows that one million rupees rise in GDP per capita income will increase per capita Carbon dioxide emissions by 72.01 metric ton per capita. The coefficient is also significant at 1 percent level of significance. The long run results are also in line with the study conducted by Fodha and Zaghdoud (2011).

The results shows that one million rupees increase in FDI inflow in transport, storage and communication sector will increase Carbon dioxide emissions by 0.0011 metric ton per capita. The coefficient of transport, storage and communication (tr) is also significant at 1 percent level of significance and results are also in line with the study done Gallagher (2004). According to Gallagher (2006) "the increased emissions from transport sector mainly depended on the non-provision of clean technologies by the foreign firms" (pp. 28). Transport sector have high emissions rate amongst all sectors and accountable for quarter of CO_2 emissions in Pakistan. Emissions control in transport sector is decisive for management of Climate Change [Draft National Climate Change Policy (2011)].

Besides, one million rupees increase in mining and quarrying sector will increase emissions by 0.0013 metric ton per capita but coefficient of mining and quarrying sector (mn) is insignificant at 1 percent, 5 percent and 10 percent level of significance. Similarly if FDI inflow in manufacturing sector increases by one million rupees the Carbon dioxide emissions will increase by 0.0012 metric ton per capita. The coefficient of manufacturing sector (man) is also statistically significant at 1 percent level of significance. The results are also in line with the study done by Jorgenson (2007). In developing countries the foreign firms use more pollution technology both in manufacturing sector and in transport sector [Jorgenson (2007)]. The results may also get support from that only Carbon dioxide emissions from the manufacturing sector in Pakistan stands at 42.2 (million metric tons) in year 2011. Further it is also suggested that the industrial sector contribute positively towards Green House Gases (GHG) [Draft National Climate Change Policy (2011)].

The results show that if the population density is increased by one unit then the emissions will increase by 0.014 metric ton per capita. Similar results were also found by Shi (2003) who proposed that population density is positively related with the Carbon dioxide emissions in long run.

Pakistan is in the list of most vulnerable countries against climate change. The recent United Nations Framework Convention on Climate Change (UNFCCC) Paris

conference 2015 has agreed to set-up a special "Technology development and transfer mechanism" for the development and transfer of new technologies from developed to developing countries [Draft Paris outcome (2015)]. In case of Pakistan there is lack of policy regarding the clean technology transfer through FDI in manufacturing, mining and quarrying and transport, storage and communication sectors. There is lack of mechanisms which can keep a check and balance on the capital equipment coming in the form of FDI.

The aforementioned discussion confirms the effect of sectoral FDI on environmental degradation in terms of Carbon dioxide emissions. Furthermore, the results show that the sign of variable (g) is positive and sign of variable (g^2) is negative which validate the existence of Environmental Kuznets Curves. The results for the Environmental Kuznets Curves are in line with the study done by Nasir and Rehman (2011).

Table 3

Normalised Long Run Results for the Impact of FDI Inflows on Carbon Dioxide Emissions

Dependent Variable= Carbon Dioxide Emissions in Metric Tons Per Capita (mt)			
	Coefficient	t-stats	P values
Constant	1.35	4.35	0.00
g_t	72.01	5.83	0.00
g^2_t	–344.74	–2.54	0.01
Tr_t	0.0011	2.44	0.00
Mn_t	0.0013	1.53	0.13
Man_t	0.0012	2.08	0.04
Pd_t	0.014	4.00	0.00
D_{2007}	0.150	2.01	0.05
D_{2008}	0.059	3.89	0.00

4.1.2. *Short Run Estimates*

Short run estimates of ARDL are given in Table 4. The coefficient of Error Correction Term (ECT) is significant and negative. The estimated coefficient of ECT shows disequilibrium is corrected or adjusted with the speed of 78 percent in-between one year. The significance ECT also confirms the long run relationship of variables as estimated earlier. According to short run results, the Δg is positively associated with the Carbon dioxide emissions in Pakistan and these results are also in line with the study by Fodha and Zaghdoud (2011). The first lag of FDI inflow in manufacturing sector (Δman_{t-1}) affect the Carbon dioxide emissions in short run also. This means that previous year FDI in this sector will affect Carbon dioxide emissions in current year. This is valid because FDI from the previous year will also produce CO_2 emissions, therefore adding to current year amount of emissions produced, the coefficient of (Δman_{t-1}) is also statistically significant at 1 percent level of significance. Δtr is also positively related to CO_2 emissions in short run. While results also showed that difference and first lag of population density are also positively related to the Carbon dioxide emissions in short run both of the coefficients are statistically significant at 1 percent level of significance. The results for population density are also in line with the study done by Shi (2003). While interestingly the EKC exist in short run also.

Table 4

Short Run Results of Impact of FDI Inflows on Carbon Dioxide Emissions

Dependent Variable = Δmt			
	Coefficient	t stats	P values
Constant	–1.05	–4.35	0.00
Δg	19.6	3.27	0.00
Δg^2_{t-1}	–461.04	–2.83	0.00
Δtr	0.0052	2.08	0.04
Δman_{t-1}	0.0078	2.01	0.05
Δpd	0.10	3.75	0.00
Δpd_{t-1}	0.088	3.88	0.00
D_{2007}	0.150	2.01	0.05
D_{2008}	0.059	3.89	0.00
ECT	–0.78	–6.89	0.00

4.2. ARDL Results for the Impact of FDI Inflows on GDP Growth

First the UECM is estimated, that contains GDP as dependent variable. The estimated UECM is given in Table 5 which includes long run as well as short run coefficients. This is parsimonious form of equation, from which insignificant terms are deleted. The outcome of test depends on the lag selection that is p = 2, selected on the bases of Akaike Info Criteria (AIC). In the model dummy variables are also included to check the impact of structural breaks in data. Different dummies were added to capture the effect of structure break. The significant dummies were in year 2007 and 2008.

Table 5

Results of UECM for the Impact of FDI Inflow on GDP Growth

Dependent Variable = Δmt			
	Coefficient	t stats	P values
Constant	–92.25	–2.88	0.00
GDP_{t-1}	–0.22	–2.74	0.00
mn_{t-1}	–13.45	–1.55	0.14
man_{t-1}	–5.34	–2.40	0.02
tr_{t-1}	–42.6	–5.83	0.00
ene_{t-1}	–0.12	–2.56	0.01
lab_{t-1}	0.03	0.71	0.48
Δman	7.44	4.24	0.00
Δtr	3.23	1.95	0.06
Δlab_{t-2}	–0.28	–3.41	0.00
Δtr_{t-2}	51.26	5.32	0.00
Δene_{t-2}	0.38	6.78	0.00
D_{2007}	0.73	2.34	0.03
D_{2008}	0.50	4.41	0.00
Breusch-Godfrey Serial Correlation LM Test, F-statistics			0.07(0.72)
R-square			0.93

After estimating the UECM, long run relationship has been checked, through testing the hypothesis that $H0{:}\beta=a_2=a_3=a_4=a_5=a_6=a_7=a_8=0$ by applying the F-test on lagged variables and compared its values with the critical values bound provided by Pesaran, *et al*. (2001). As the value of F is 15.21, k is 5, the F_{III} (Unrestricted intercept and no trend) has critical values of upper I (1) and lower bound I (0) that are (2.96 4.81), so the null hypothesis H_0, that there is no co-integration is rejected at, 0.05 level of significance. This further concludes existence of co-integration.

4.2.1. *Long Run Estimate*

The results show that if FDI in manufacturing sector is increased by one million rupees, the GDP will increase by 24.27 million rupees. The coefficient of FDI inflow in manufacturing sector (man) is also statistically significant at 1 percent level of significance and it is positively related to GDP growth in long run (Table 6). The results are also in line with the study conducted by Chakraborty and Nunnekamp (2008).

The results further showed that one million increases in FDI inflow in mining and quarrying sector will increase GDP by 61.33 million rupees. The coefficient of FDI inflow in mining and quarrying sector (mn) is statistically insignificant at 1 percent, 5 percent and 10 percent level of significance. There is no significant relationship between the FDI inflow in mining and quarrying sector and economic growth, that is because of the fact that when foreign investment is involved in this sector foreign firms take lions share from the host countries that's the reason that FDI in this sector does not contribute towards economic growth. The results are also in line with the study by Chakraborty and Nunnekamp (2008).

Further results showed that one million rupees increase in FDI inflow in transport, storage and communication sector will increase GDP by 193.43 million rupees. The coefficient of FDI inflow in transport, storage and communication sector (tr) is also statistically significant at 1 percent level of significance. Similar result was also found by Gangnes, *et al.* (2006).

One million increases in labour force variable will decrease GDP by 0.13 million rupees. Labour can contribute negatively towards GDP growth, this happens when labour is not efficient. This idea was also supported by Khan and Qayyum (2007).

Table 6

Normalised Long Run Results for the Impact of FDI on GDP Growth

Dependent Variable= GDP (Million Rupees)			
	Coefficient	t stats	P values
Constant	419.3	2.88	0.00
Man_t	24.27	2.40	0.02
Mn_t	61.33	1.55	0.14
Tr_t	193.43	5.83	0.00
Ene_t	0.54	2.56	0.01
Lab_t	–0.13	–0.71	0.48
D_{2007}	0.73	2.34	0.03
D_{2008}	0.50	4.41	0.00

Results showed that increase of one million metric tons of oil equivalent in energy consumption will increase GDP by 0.54 million rupees. This shows a positive relationship among energy consumption variable and GDP growth variable, further the coefficient of energy consumption (ene) is statistically significant at 1 percent level of significance. The results are also in accordance with the results of Glasure (1998) and lee and Chang (2008).

4.2.2. *Short Run Estimates*

Short run estimates of ARDL are given below in Table 7. The ECT is significant and negative. The estimated coefficient of ECT shows disequilibrium is corrected or adjusted with the speed of 22 percent in-between one year. The significance ECT also confirms the long run relationship of variables as estimated earlier. The results showed that FDI inflow in manufacturing sector and transport, storage and communication sector contribute positively towards GDP in short run also. The difference and second lag of variable transport, storage and communication sector (tr) is statistically significant at 10 percent and 1 percent level of significance which shows that FDI inflow in this sector is positively related to GDP increase in short run. This argument is valid because services sector is the largest contributor towards Pakistan's GDP [Economic Survey of Pakistan (2011)]. When the investment in this sector take place the effect can be seen in GDP growth after one or two year that is the reason that second lags of variable (tr) is statistically significant. The investment made in this sector affect the GDP in coming years also.

Further the energy consumption is also positively associated with the increase in GDP in short run. The variable of energy consumption is also statistically significant at 1 percent level of significance. The short run results of energy consumption are also in line with the results of Lee and Chang (2008). Interestingly the second lag of labour force is negatively affecting the GDP; the coefficient of second lag of labour force is also statistically significant at 1 percent level of significance. This happen due to labour inefficiency in Pakistan. This demands human capital growth in the country.

Table 7

Short Run Results of Impact of FDI Inflows on GDP Growth

ΔGDP= Gross Domestic Product (Million Rupees)			
	Coefficient	t stats	P values
Constant	–92.25	–2.88	0.00
Δman	7.44	4.24	0.00
Δtr	3.23	1.95	0.06
Δlab_{t-2}	–0.28	–3.41	0.00
Δtr_{t-2}	51.26	5.32	0.00
Δene_{t-2}	0.38	6.78	0.00
D_{2007}	0.73	2.34	0.03
D_{2008}	0.50	4.41	0.00
ECT	–0.22	–2.74	0.00

5. CONCLUSION AND POLICY IMPLICATION

This study examined the effect of FDI inflow on Carbon dioxide emissions and GDP growth and checked the validity of EKC hypothesis in Pakistan for the time period of 1972–2011. Per capita Carbon dioxide emissions was used as indicator of environmental degradation and real GDP as economic growth. The ARDL model was employed for the estimation purposes. The findings revealed that FDI inflow in manufacturing sector, transport, storage and communication sector and population density have positive impact on the environmental degradation in the long run. The EKC hypothesis is also valid in the long-run for Pakistan. Further, population density, FDI inflow in transport, storage and communication sector and manufacturing sector variables add significantly to the deterioration of environment in the short-run also. The EKC hypothesis is valid in the short-run also. Furthermore, the coefficient of FDI inflow in manufacturing sector, transport, storage and communication sector and energy consumption are statistically significant and these are the major influencing factors of GDP growth.

To protect environment from increasing Carbon dioxide emissions, the government should consider sector specific FDI inflow in the economy in their policy. Special attention should be given to population control to lessen the pressure on the increasing Carbon dioxide emissions in the country. Furthermore, to stimulate economic growth in both short and long run, the FDI inflow in manufacturing and transport, storage and communication sector must be promoted. The government must also invest in human capital. This will not only increase the labour productivity but also the quality of the labour.

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55:2 (Summer 2016) pp. 113–122

Does Happiness Adapt to Increase in Income? Evidence from Pakistan Socio-economic Survey (1998-2001)

HAMID HASAN

The fact that happiness does not increase as income increases over time [the Easterlin Paradox (1974)] has puzzled a number of scholars for a number of decades. The latest research on this topic [Easterlin, *et al*. (2010)] concludes that happiness increases with an increment in income in the short term but it adapts to this income increment in the long term.

The objective of this research is to test whether happiness adapts to income increase in the short term using two-period panel Pakistan Socio-Economic Survey [PSES (1998-2001)]. The paper makes use of a unique question on happiness asked in PSES to resolve two issues simultaneously: unavailability of happiness question in period 1 and potential inconsistency of responses to general happiness question.

The paper applies Random Effect Ordered Probit model to investigate the hedonic adaptation effect using various formulations used in the happiness economics literature.

The results show positive and statistically significant impact of income change on happiness with weak evidence of adaptation to income since it is statistically insignificant. The result is consistent with the studies that show no adaptation during a short period. Among several reasons for hedonic adaptation, falling positive emotions and rising aspirations are discussed along with causes of happiness and policy implications.

The significance of the present research lies in the fact that it is the first study in Pakistan that tests the hedonic adaptation to income and hence contributes to the evidence on happiness dynamics.

JEL Classification: I31, D60, C25
Keywords: Happiness, Adaptation, Income, Panel Ordered Probit Model

I. INTRODUCTION

The evidence of rising income with no corresponding increase in happiness [the Easterlin Paradox (1974)] has led to extensive research on happiness. One of the explanations to the Easterlin Paradox is that people adapt their happiness to income over time and this explanation is termed as hedonic adaptation or hedonic treadmill in the literature [Brickman and Campbell (1971)]. It describes how people tend to adapt to good or bad events and then return to the same baseline level of happiness [Bottan and Truglia (2011)].

This paper empirically analyses adaptation of happiness to income, an issue that has not been conclusively settled. However, evidence from long panel surveys like BHPS (British Household Panel Survey) and GSOEP (German Socio-Economic Panel), is in favour of (incomplete) adaptation of happiness to income [Clark, *et al.* (2006); Di Tella,

Hamid Hasan <hamidiiiepd@yahoo.co.uk> is Assistant Professor of Economics, Department of Economics, School of Business, King Faisal University, Kingdom of Saudi Arabia.

et al. (2010)] but no efforts have been made to analyse happiness adaptation to income in case of Pakistan, and in developing countries in general (there are no case studies for developing countries due to limited data availability on happiness. However, there are cross-country studies, for example, Easterlin, *et al.* (2010) and Frey and Stutzer (2002)]. The present paper analyses this issue by creating a short panel data on happiness using a proxy variable for the first period in the two-period Pakistan Socio-Economic Survey (PSES) panel due to the unavailability of data on happiness in the first period. Hence, the present work would provide one of the first studies of this issue for a developing country.

There are many studies that provide evidence of hedonic adaptation to specific life domains such as adaptation to income [Di Tella, *et al.* (2010)] and to life events such as marriage, divorce, and unemployment [Clark, *et al.* (2006)]. The details of earlier studies related to specific life domains are given in Frederick and Loewenstein (1999). There are, however, some studies that show existence of general hedonic adaptation, in contrast to specific adaptation cited above.

Bottan and Truglia (2011) argue that there may be general adaptation to happiness regardless of the domain: 'having experienced moments of happiness (unhappiness) today may make people more prone to feelings of unhappiness (happiness) in the future, regardless of the source of the original increase (decrease) in well-being'. They provide indicators of effect of specific and general adaptation from econometrics' perspective: the former is captured by the lagged coefficient on, for example, income while the latter is shown by the lagged coefficient on happiness. They derive interesting conclusion from this study: the adaptation effect of increased income is twofold—one is the specific effect of increase in income that leads to high income aspirations in the future and hence a fall in happiness in the future, and the other is the general effect of increase in income that leads to increased happiness in the present but make people prone to unhappiness in the future.

Diener, *et al.* (2006) propose five revisions in the original treadmill model. These revisions are, to wit: non-neutral set points,[1] individual set points, multiple set points, and individual differences in adaptation. These revisions allow us to explain incomplete or non-adaptation in the data. The following section presents a variety of formulations discussed in the literature that allow for hedonic adaptation to income.[2]

The paper proceeds as follows: Section II discusses various formulations of hedonic adaptation models. Section III estimates the model and delineates estimation results. The final section summarises the results and concludes the paper with policy implications and recommendations.

II. THE MODEL

Many formulations are proposed in the literature to study hedonic adaptation. Based on empirical findings, Layard (2006) proposes the following happiness function with a negative effect of the lagged income to allow for adaptation:

[1]The set point is a term in psychology for a genetically determined hedonic or happiness point to which a person converges after a positive or negative shock.

[2]A distinction is made between hedonic and eudemonic approaches to happiness in psychology. The former relates to pleasure as a stand alone concept where as the latter not only considers happiness but also the sources and processes that lead to happiness.

$$U_{it} = U\,(y_{it} - \beta y_{it-1},\, h) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where U_{it} is the happiness of the ith individual at time t, y_{it} is the real household income of the ith individual at time t, y_{it-1} is one period lag of real household income of the ith individual at time t–1, and h is number of hours of work.

Another formulation considered in Layard (2006) is to allow for loss-aversion:[3]

$$U_{it} = U[(1-\beta)y_{it} + \beta\Delta y_{it},\, h] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Based on Layard's explanation, loss-aversion can be defined as:

$$\Delta U_{it}|\Delta y_{it} < 0 >> \Delta U_{it} \mid \Delta y_{it} > 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

That is, the effect of a unit change in income on happiness is greater when income falls than when income rises. The asymmetry of happiness response to changes in income is an important finding attributed to Kahneman and his colleagues [Kahneman and Tversky (1979)], and has many important policy implications.

Somewhat similar to model in (1), Clark, *et al.* (2006) considers the following formulation with current real income and change in real income:[4]

$$U_{it} = \beta_1 \ln(y_{it}) + \beta_2 \ln (y_{it} \mid y_{it-1}) + \gamma Z_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

where Z indicates demographic variables (gender, age, education, and urban or rural region). These demographic variables are included in order to control the effect of income (y) on happiness (U) since all these variables are assumed to affect happiness directly.

Ferrer-i-Carbonell and Van Praag (2008) consider many modifications of the following general specification:[5]

$$U_{it} - U_{it-1} = \beta(y_{it} - y_{it-1}) + \delta Z_{it} + \gamma(Z_{it} - Z_{it-1}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

To allow for loss-aversion, for instance, they consider the following specification:

$$U_{it} - U_{it-1} = \beta_1 \Delta y_{it}^{+} + \beta_2 \delta Z_{it} + \gamma(Z_{it} - Z_{it-1}) \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

Where

$$\Delta y_{it} \text{ for } \Delta U_{it} \mid \Delta y_{it} > 0 \text{ and } \Delta y_{it}^{-} \text{ for } \Delta U_{it} \mid \Delta y_{it} > 0 \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

Bottan and Truglia (2011) test whether happiness is autoregressive and use models similar to the following formulation:

$$U_{it} = \alpha U_{it-1} + \beta_1 \ln y_{it} + \beta_2 \ln y_{it-1} + \gamma_1 Z_{it} + \gamma_2 Z_{it-1} \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

Where a negative (positive) coefficient on lagged happiness variable would show that happiness is adaptive (inertial). This model captures both general and specific effects of

[3]The asymmetry of income comparison by higher income group and lower income group is termed as loss aversion by Kahneman and Tversky (1979) in their prospect theory.

[4]This is not the exact specification used in Clark, *et al.* (2006). I have modified it to suit for a two-period panel.

[5]The original specification given in Ferrer-i-Carbonell and Van Praag (2008) is for more than two time periods.

happiness adaptation by lagged values on happiness and income respectively. The next section describes data, sampling, method used to estimate hedonic adaption to income using various formulations discussed above, and discusses results.

III. THE METHODOLOGY AND RESULTS

Data

To study happiness adaptation to income, we need individual-level panel data. In Pakistan, there are three such panel datasets available: IFPRI (International Food Policy Research Institute) from 1986 to 1991 (biannual visits in 5 years), PSES (Pakistan Socio-Economic Survey), 1998-99 and 2001, and PPHS (Pakistan Panel Household Survey), 2001, 2004, and 2010.[6] Except PSES, none of the other two datasets have happiness questions in their questionnaire.[7] Therefore, we resort to PSES to explore this issue. We use PSES dataset at individual level.[8] PSES surveys all urban and rural areas of the four provinces of Pakistan (Punjab, Sindh, Balochistan, and NWFP)[9] defined as such by the 1981 population census excluding FATA (Federally Administered Tribal Areas), military restricted areas, districts of Kohistan, Chitral, Malakand, and protected areas of KPK. The population of the excluded areas constitutes about 4 percent of the total population**.**

Sampling

A two stage stratified sample design is adopted for the 1998-99 PSES. Enumeration blocks in urban areas and Mouzas/Dehs/villages in rural areas are taken as primary sampling units (PSUs). Households within the sampled PSUs are taken as secondary sampling units (SSUs). Within a PSU, a sample of 8 households from urban areas and 12 households from rural areas is selected. Households covered during round I of the PSES are revisited during round II in 2000-01. After some adjustment due to attrition, the total sample for round II of the PSES turns out to be 4021 households (2577 rural and 1444 urban).

The dataset comprises of 6749 individuals who directly responded to the subjective questionnaire (21 questions), after list-wise (subject-wise) deletion of the missing values. Since the number of missing values is very low (around 2 percent) and their pattern is random (i.e., missing at random), deleting them in this way will not cause any statistical problems such as bias.

Estimation

The PSES at individual level is used to estimate the models similar to various formulations given above for two period panel data from the PSES phase 1 (1998) and phase 2 (2001). The objective is to test for specific and general adaptation effects as given in Bottan

[6]PPHS rounds 2001 and 2004 contain only rural samples and hence these datasets are called PRHS (Pakistan Rural Household Survey). For detail of PPHS, see Nayab and Arif (2012).

[7]PPHS (2010) contains a section on subjective welfare but it only asks about relative economic position.

[8]The PSES (2001) is based on round II of the PSES. The sample design for round II is based on the sample design of round I conducted in 1998. Details of the sample design are given in Arif, *et al.* (2001) and Siddiqui and Hamid (2003).

[9] NWFP is now known as Khyber Pakhtunkhwa (KPK).

and Truglia (2008). The life happiness question[10] is not available in phase 1. However, there is a question in phase 2 asking about happiness relative to the past.[11] That question is used to make a surrogate for life happiness question in phase 1. This question also provides a great advantage in interpreting happiness over time. Generally, the question on happiness asks how satisfied or happy are you with your life overall, in general, or all things considered. People answer this question using different reference points like comparing with last year's happiness, with neighbours', or with their contra-factual situation—how happy they could be if they had done things differently [Bottan and Truglia (2011)]. To estimate general hedonic adaptation, we need lagged values on happiness variable. However, if this variable is constructed by the responses to a general happiness question given above then it may have different interpretations according to different reference points. The best solution to obtain lagged values consistent over time is to construct it from the responses to the question comparing present happiness with past happiness. A number of studies based on panel data may have inconsistency issue in their happiness variable since most of the long panel datasets like British Household Panel Survey, German Socio-Economic Panel Study, and Swiss Household Panel ask the general happiness question.

The estimation is run using the sample common in both phases at individual level. Since the happiness question has only three categories (1. Very happy 2. Happy 3. Not so happy), it is considered ordinal and an ordered probit panel model is used for estimation. This is the most suitable estimation technique when we have ordered dependent variable with panel data. The unobservable individual traits are considered random and assumed to be uncorrelated with included variables in the model. These assumptions are plausible since there is very high heterogeneity in individuals' responses, and hence a random effects model is preferred to the fixed effects model. The theoretical formulation (Crouchley's formulation) of ordered choice models with random effects for panel data are given below [Greene and Hensher (2008)]:

$$U_{it}^{*} - \beta' y_{it} + u_i + \varepsilon_{it}$$
$$U_{it} = j \quad \text{if} \quad \mu_{j-1} \leq U_{it}^{*} < \mu_j$$

U_{it}^{*} is a an unobserved (latent) variable,
U_{it} is a manifested variable equal to the jth category,
y_{it} is a vector of explanatory variables,
$\varepsilon_{it} \sim N(0, 1)$, stochastic error term,
$u_{it} \sim N(0, \sigma^2)$, random effect term independent of ε_{it} for all t, and
$\mu's$ are cut-off points for each category.

The parameters β's and the cut-off points are estimated using maximum likelihood.

Results

[10] "On the whole, how happy are you with the kind of things you have been doing in recent years?".
[11] "Compared with the past, do you feel your life is: 1. Very happy 2. Happy 3. Not so happy".

Table 1 summarises the results of the random effects ordered probit models.[12] The coefficient on lag nominal income (LAGLNNY) is negative (–0.0163) but statistically insignificant in model 1. Economic criterion suggests that there is an evidence of adaptation to income (after initial impact of income, 27.5 percent is lost over the year (that is, 0.0163/0.0592)) but statistical criterion does not endorse that conclusion. Hence current happiness depends only on current income and is not affected by the previous level of income.

Table 1

Random Effects Ordered Probit Models

(Key: LAG = Lagged Value, LN = Natural Log, N = Nominal, Y = Income, D = First Difference, R = Real, HAPP = Happiness, (…) = Dependent Variable)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	(HAPP)	(HAPP)	(HAPP)	(HAPP)	(HAPP)	(DHAPP)	(HAPP)	(HAPP)
Constant	**–0.2462**	0.2157	0.0053	0.2157	**0.0053**			
Gender	–0.0533	–0.0553	–0.0539	–0.0553	–0.054			
Age	**0.0013**	**0.0013**	**0.0013**	**0.0013**	**0.0013**			
Education	0.0040*	0.0047	0.0042*	0.0047	0.0042*			
Urban	**0.0501**	0.0670	0.0548*	0.0699	0.0548*			
LNNY	0.0592							
LAGLNNY	**–0.0163**							
DLNNY		0.0378						
LNRY			0.0542		**0.0327**		0.0513	
LAGLNRY			**–0.0215**				**–0.0248**	
DLNRY				0.0378	**0.0215**	0.0646		0.0401
LAGHAPP							0.0969	0.1984
Correct Prediction (%)	39.96	39	39.5	39.3	39.5	10	36.3	35.6
Adaptation Effect	No	No	No	NO	NO	NO	INERTIA	INERTIA

Note: Coefficients highlighted in bold are insignificant, those marked by a *significant at 10 percent, and all other significant at 5 percent.

The coefficient for first-order difference of nominal household income (DLNNY) is positive and significant in model 2. This indicates a positive effect of income changes on happiness. It may indicate adaptation to income if we restrict coefficients of current and lagged incomes to be the same.

Model 3 and model 4 show similar results to the above models but with real income (LAGLNRY and LNRY). After initial impact of income, 40 percent is lost over the year (that is, 0.0215/0.0542) in model 3 but the coefficient on lagged value is statistically insignificant. Whereas model 4 has same effect on happiness like nominal income in model 2.

The coefficients for current income (LNRY) and first-order difference income (DLNRY) are positive but insignificant in model 5. Moreover, the log likelihood is flat at the estimates which indicates wide confidence intervals.

[12]All estimations are done by NLOGIT 4.0 (LIMDEP 9.0) econometric software developed by William Greene.

The dependent variable is change in happiness (DHAPP) in model 6 and the coefficient of first-order difference real income (DLNRY) is positive and significant but log likelihood is flat at current estimates. This shows that change in income has a positive effect on change in happiness.

The coefficient for current income (LNRY) is positive and significant, the coefficient of lagged income (LAGLNRY) is negative but insignificant, and the coefficient on lagged happiness (LAGHAPP) is positive and significant but the log likelihood is flat at current estimates in model 7. The positive coefficient on lagged happiness would indicate inertia in happiness. Since the time periods are two years apart and it might be the case that the gap is too long so that happiness dissipates over this interval to its previous level and hence shows adaptation. If that is the case it would indicate an adaptation effect. The other extreme case is also possible—the gap is too short—and the happiness would take time to adjust to its previous level after the passage of a long time, and hence would depict inertia.

The coefficient on differenced real income (DLNRY) is positive and significant, and the coefficient on lagged happiness (LAGHAPP) is positive and significant in model 8. It has the same interpretation as model 7.

A comparison of the eight models, estimated above, is made on the basis of percentage of correct predictions. All models show correct predictions in the range of 35 percent to 40 percent except model 6 with only 10 percent correct predictions. These models may provide a weak evidence for hedonic adaptation to income, although inconsistent with the findings on long panels like German Socio-Economic Panel (GSOEP) and British Household Panel Survey (BHPS), is yet consistent with most of the findings in the literature [see, Clark, *et al.* (2006) for a review of this evidence].

IV. SUMMARY, CONCLUSIONS, AND POLICY IMPLICATIONS

The study tests the existence of hedonic adaption to income using PSES two panel datasets for 1998-99 and 2001. Adaptation implies that the marginal utility of income is diminishing over time particularly over a long period of time as shown in many empirical studies using long panel datasets. But this is not true in the short time period as evident from the present study and earlier studies [for example, Bottan and Truglia (2011**)]**. Easterlin, *et al.* (2010) attempts to resolve this paradox. The study finds that happiness and income are directly related in the short term but they are not related in the long term (for a period of more than 10 years). Since present study uses a very short panel, it confirms Easterlin, *et al.* (2010) findings. However, the findings in the present study should be taken with caution since the panel is relatively short and the happiness in phase 1 is measured with a surrogate. The evidence of inertia in some models remains inconclusive unless supported by evidence from a longer panel.

There are many explanations possible for adaptation (non-adaptation) to income increase. According to the hedonic adaptation prevention model [Lyubomirsky (2011)], a(n) decrease (increase) in positive changes and events followed by positive emotions like gratitude, inspiration, and appreciation, and high (low) aspirations lead to adaptation (non-adaptation). Not pursuing (pursuing) intrinsic and self-determined goals also reduces (enhances) happiness. Layard (2005) identifies seven causes of happiness: family relationships, financial situation, work, community and friends, health, personal

freedom, and personal values. Though these factors causes happiness to increase but to maintain this increasing trend, we need to slowdown the process of adaptation by using positive emotions and positive changes.

Extravagant current consumption can reduce future happiness. Tax instrument can be used to discourage too much current consumption so that people save more and maintain their same level of happiness in the future.

Increase in real wages will also affect happiness. Along with minimum regular pay, performance-related pay should be introduced and be rewarded rapidly, generously, and frequently to motivate and enhance positive emotion. We can invoke Kahneman's findings on loss aversion to derive implications for prompt reward and delayed reward. The same amount of reward can have different effects on happiness because of difference in time. Similarly and obviously, small and large rewards have very different effects on motivation. Frequent rewards combined with surprise can be very effective to enhance positive emotions. Oswald, *et al.* (2014) shows that happiness increases productivity and performance at workplace, and hence firm's promotion policies have positive effect on employees' performance. The study finds that happier individuals have approximately 12 percent greater productivity.

Welfare policies should be designed in such a way to maintain work-life balance so that people have enough time for family, friends, and community so that their emotional well-being can be enhanced.

At macro level, steps should be taken to minimise unemployment and to stabilise inflation since unemployment reduces nominal income, on average, whereas inflation diminishes real income. There is strong evidence that both have negative impact on happiness as confirmed by many studies [see, for example, Gandelman and Murillo (2009); Di Tella and MacCulloch (2001, 2006, 2008); Frey and Stutzer (2002); Di Tella, MacCulloch, and Oswald (2001, 2003); Wolfers (2001); Oswald (1997); Clark and Oswald (1994)].

The present study is limited to happiness-income relationship with some demographic variables as controls since the focus of study is on adaptation. However, other variables can be included that serve as proxies for time spent with family and friends, and in community.

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55:2 (Summer 2016) pp. 123–149

Do Workers' Remittances Boost Human Capital Development?

MUHAMMAD AZAM and SYED ALI RAZA

This study examines the influence of workers' remittances along with the economic governance system on human capital development in 17 countries having low income, lower middle, upper middle and high income levels by using the annual panel between 1996 and 2013. Overall, results of fixed-effects model reveal that workers' remittances have significantly positive impact on the human capital development. Results also reveal the positive and significant impact of all selected variables of economic governance system on human capital. It is concluded that the strong economic governance system strengthens the association between workers' remittances and human capital during the aforementioned time period.

JEL Classification: F24, J23
Keywords: Remittances, Economic Governance System, Human Capital Development

1. INTRODUCTION

A number of factors contribute to the national economic development systems as well as humans living standards. One of the leading factors in this regard is the workers' remittances to the developing countries; where the workers' living abroad transfer money to their home countries. Every state aims to improve society's welfare using different approaches and sources. The role of migrant remittances, in this regard, is highly vital because they contribute evidently in the economic growth and development process. Consequently, remittances play an effective and positive role in poverty alleviation and in improving the human capital of the developing world. However, some studies support the positive impact of emigrant remittances, as well as there are some studies disagree with aforementioned role of the workers' remittances. Those who disagrees point out the remittances are used for unproductive purposes. For example, Chami, *et al.* (2003) observe that the receipt of migrant remittances can produce behavioural changes as remittances inflows tend to be consumed on consumption good rather than investment goods. Similarly, the studies of Rodriguez and Tiognson (2001) and Amuedo-Dorantes and Pozo (2004) explored that migrant remittance may have negative effect on domestic competitiveness depressing the expected returns on capital and thereby resulting in lower the rate of capital accumulation. Similar results are shown in a study by Okolski (2006) reflecting that the money transferred by migrant to Central and Eastern Europe countries is mostly utilised to enlarge migrant household consumption. The impacts of international

Muhammad Azam <drazam75@yahoo.com> is affiliated with the School of Economics, Finance and Banking, College of Business, Universiti Utara Malaysia and Department of Economics, Abdul Wali Khan University, Mardan. Syed Ali Raza <syed_aliraza@hotmail.com> is affiliated with the Department of Management Sciences, IQRA University, Karachi.

remittances with regard to investment are scarcely apparent on the level of regional economy. However, a trend of the enlarged expenditures of remittances on the education of immigrants' children is being detected in the case of Poland.

A study by Asiedu (2003) discloses that almost 30 percent of international remittances are spending for the investment and formation of house purposes in Ghana. Cox-Edwards and Ureta (2003) find that children from remittance receiver households are less expected to drop out of school, which they attach to the easing of budget limitations affecting poor receiver households in El Salvador. Hanson and Woodruff (2003) observe that migrant remittances are linked with higher educational attainment in rural Mexico, specifically among 10-15 year old girls whose mothers have little educational levels. Adams and Page (2005) expound that migrant remittances have a robust statistically significant negative effect on poverty in 71 developing countries. The results show that a 10 percent upsurge in the share of international remittances in a country's Gross Domestic Product (GDP) would reduce 1.6 percent of people living in poverty. The World Bank (2006) report reveals that it is empirical confirmed that migrant remittances usually diminish poverty and can reallocate income. The study of Ziesemer (2006) suggests that the key indication is that workers' remittances boost savings, whereas, savings perform two things. They lower interest rates, those stimulate investment, and savings augment either school enrolment or keep the school enrolment intact by guaranteeing finance and thereby promoting literacy. Consequently, both investment and literacy help in boosting up the GDP per capita growth rate.

A study by Rapoport and Docquier (2006) explicate that migrant migrants' remittance are usually spend to pay back loans, acquired to finance migration or education, and insurance. Therefore, those directly contribute to household income which enables households to buy more assets; supports greater investment in business; and enable procurement more goods, consist of education and health inputs. Acosta (2007) exposes that the nature, magnitude, and evolution of international remittances flows, it would not be a disbelief that international remittances are now realised by development experts as having a possibly vital role to play in sustaining the development struggles of the host countries. The study further explains that there are two major ways through international remittances those can maintain these efforts. Firstly, international remittances, received by the poorest class of the population directly contribute to poverty decline. It implies that remittances have significantly positive effect on welfare effects of the recipient countries. Secondly, international remittances may contribute towards better investment in human and physical capital. Meanwhile, international remittances can possibly add in growing the country's long-run growth potential through greater rates of capital formation. Pant (2008) explores that whether international remittances are consumed for consumption, for acquiring houses or for any other investments; those reflect positive effect on the entire economy by encouraging demand for other goods and services. As the migrants provide capital that certainly have progressive effect on their countries of origin.

In the same way, the studies of Yang (2008) and Annen, *et al.* (2014) indicate that migrants' remittances are transitory type of income, and the households wish to consume them more on investment goods including; human and physical capital investments than on merely consumption goods, and thereby it positively contribute to economic growth and

development. It implies that an upsurge in remittances inflows capitulate a positive income effect to education spending which increases the marginal benefit of human capital gaining activities. Received income from remittances have a positive effects on schooling which consequently leads to improvement in human capital and in that way fostering long-term output of the recipient countries. The study of Yang (2008) maintains that accrued migrant earnings can let investments that would not have else been made because of credit limitations and large up-front costs. Generally, remittances receipts to be constructively associated with several types of household investments in the developing world. The positive income shocks lead to boost human capital accumulation and entrepreneurship in the migrant's origin households. The positive migrant shocks also lead to larger child schooling, decrease child labour, and enlarge educational spending in the Philippine. Rao and Hassan (2010) expounds that the most important indirect growth influence of workers' remittances those have gained insufficient attention is the impact on human capital development through education. International remittances are now the most important private financial resources for households in home countries immigrants, whereas remittances cannot be studied as an alternative for foreign direct investment, foreign aid, and external debt. International remittances are relatively secure and foreseeable as compared to other the financial inflows [United Nations (2010)]. Migrant remittances have positive effect on human development outcomes across several areas including; education, health and gender equality [Ratha (2013)]. The study of Azam and Ahmed (2015) also shed light on the indispensable role play by the human capital in the process of economic growth and development.

Migrant remittances are substantial sources of several low income countries; therefore, eliminating barriers to migrant remittance flows may assist in maintaining strong inflows.[1] Evidently, international remittances have been drastically growing in developing countries. According to the World Bank statistics, remittances flows to developing countries, are estimated almost USD435 billion in 2014. The remittance growth rate this year is considerably faster than the 3.4 percent growth documented in 2013, driven mostly by migrant remittances to Asia and Latin America. It is expected that remittances flows to developing world will continue rising in the medium term, touching an estimated USD454 billion in 2015. Remittance inflows offered constant cover for considerable parts of the import bill for countries like; Egypt, Pakistan, Haiti, Honduras, and Nepal. The remittances inflows to India and China are estimated USD71 billion and USD 64 billion respectively in 2014. The inflows of remittance are likely to grow strongly to almost all regions, with the exception of Europe and Central Asia, of the developing world due the conflict in Ukraine and related sanctions are contributing to an economic downtrend in Russia. While, the East Asia and Pacific and South Asia regions are expected to enhance the greatest remittance flows. Evidently, India received almost USD$71 billion in remittances in 2014, with the world's leading emigrant stock of 14 million people. The other outsized recipients are China (USD64 billion), the Philippines (USD28 billion), Mexico (USD24 billion), Nigeria (USD21 billion), Egypt (USD18 billion), Pakistan (USD17 billion), Bangladesh (USD15 billion), Vietnam (USD11 billion) and Ukraine (USD9 billion).[2] The Human Capital Index (HCI)–2015 reveals that

[1]World Bank (2015).
[2]Ratha (2014).

the Asia and the Pacific is visibly the world's most densely inhabited region, scores towards the middle of the range of the HCI overall average score is projected 67.83. Where almost half of the countries in the entire region have attained near-universal primary school enrolment rates on average nearly 20 percent of the region's under 15 age group is yet not registered in secondary education. The HCI in the Europe and Central Asia, overall average score is estimated 77.06. Most countries in the region are very near to having accomplished universal primary school enrolment. The HCI in the Latin America and the Caribbean region score in the middle range of the Index, jointly with the Asia and the Pacific region, with an overall average score of 66.46. Though, many countries in the region have not yet attained universal primary school enrolment. While several countries perform well in primary school enrolment in the Middle East and North Africa (MENA) region. Similarly, the Sub-Saharan Africa region, with an overall average score of 54.46, ranks lowest compared to other regions, indicating the same display across all age groups excluding for the 65 and over age group, in which it performs slightly better than the MENA region [World Economic Forum (2015)].

Some erstwhile studies claim that the examination of benefits accumulating to migrants' source countries is a crucial and practically uninvestigated area in research on migration.[3] Therefore, the broader aim of this study is to explore the effect of immigrants' remittances along with economic governance system of the beneficiary countries' education human capital, measured by gross secondary school enrolment (%) for a set of 17 countries from low, lower middle, upper middle and high income countries. We assume that characteristics of these countries are almost similar. The outcomes of the study are expected to guide the policy-makers to enhance more international remittances flows strengthen good governance which will help further in the process of human capital formation and consequently economic growth and development. This is the first inclusive empirical study on the subject mentioned above. One of the main contributions of this study is to prolong the literature on the positive role played by migrant remittances, by discovering the role of international remittances inflows in the enhancement of human capital formation in the countries of origin of migrants.

The rest of the study is structured as follows. Section 2 deals with a brief review of the relevant literature on the subject. Section 3 presents the empirical methodology and data description. Section 4 discusses empirical results followed by the Section 5 that concludes the study.

2. PREVIOUS EMPIRICAL STUDIES

Numerous studies have been carried out on the impact of migrant remittances on the economic growth with a little attention paid towards empirical impact on the human capital formation. Previous studies investigate inconclusive results that whether or not the migrant remittances contribute positively in the process of human capital formation, for example, Funkhouser (1992) suggests that international remittances not only bear a positive impact on physical investment, but those can also develop human capital formation, for instance investment in education and health. The main findings revealed in a study by Looney (1992) explores that countries in the Arab world have practiced growths in human capital development accompanying with improved rates of military participation. Heylen, *et al.*

[3]Borjas (1999).

(2003) find that government spending on education has significant positive impact on human capital for 93 countries during 1975-1995, while the empirical results on inflation variable indicates that growing inflation mostly accelerates human capital. Ziesemer (2006) finds that overall migrant remittances have positive impacts on the school enrolment, literacy and thereby increase the GDP per capita growth rate for 99 countries over the period ranging from 1960-2003. Ponce, *et al.* (2008) observe that remittances have a positive effect on consumption, and on education and health spending in Ecuador; however the study failed to find any significant impacts on education and health outcomes. The study also observes that children getting international remittances have a higher prospect of attending private schools, whereas, people getting international remittances purchase more medicines and are expected have better medical treatment in case of sickness.

The study by Bansak and Chezum (2009), reveals that young girls benefit much less from international remittances, but suffer less harm from household trouble, when investigating the effect on human capital in Nepal, whereas it helped women maximally. Civilize and Frenk (2009) find that the impact of migrant remittances on infant mortality depend on how households consume remittance income received. However, the study verified that infant mortality will be less predominant in migrant remittance receiving households during a survey conducted between 1992 and 1999. Adenutsi (2010) finds that international remittance inflows have a significant positive long-run effect on largely human development in 18 low-income Sub-Saharan African countries during 1987-2007. Udah (2011) detect that foreign remittances affect economic performance in Nigeria through its collaboration with human capital and technology transmission over the period of 1970-2008. In a similar way, the study uphold by De and Ratha (2012) examines the developmental impacts of migrant remittance income on the recipient households during a survey conducted across all nine provinces of Sri Lanka between October 1999 and the third quarter of 2000. The results reveal that international remittance income has significantly positive impact on children health and education, but not on visible consumption or asset enlargement.

A study by Matano and Ramos (2013) explores the impact of foreign remittances on education outcomes in Moldova using household data for the year 2008. The probit and IV probit estimates indicate that family receiving remittances enlarges the possibility of getting higher education of about 33 percent. In addition, the migrant education level has a significantly positive effect on family members' education. The study of Joseph and Wodon (2014) finds that international remittances have a significantly positive impact on human development outcomes (school enrolment) in Yemen, during a survey includes 13136 households during 2005-2006. The empirical findings of Salas (2014) study suggest that migrant remittances have a significantly positive impact on the likelihood to send children to private schools in Peru over the period from 2007-2010. Azam (2015) discovers the existence of a significant positive association between international remittances and economic growth in four developing Asian countries namely Bangladesh, India, Pakistan and Sri Lanka during 1976-2012. Similarly, a study by Bouoiyour and Miftah (2015) explores the effect of migrant remittances on household spending and relative poverty in Morocco, while, using propensity score matching techniques to the 2006-2007 Moroccan living standards measurement survey. The study observes that international remittances can foster living standards among Moroccan households and affect destructively the incidence of poverty in the country.

On the other hand, the study of Booth (1995) reveals that labour immigration and receipts of remittances may have contrasting effects in children's education enhancement. The study of Boucher, *et al.* (2005) reveals that the effect of migration from rural Mexico to the United States does not exhibit positive on schooling, nor does it considerably affect human capital formation. McKenzie and Rapoport (2006) suggest that migration is inversely associated with school attendance rates and whole education level. The reason of the inverse effect of migration on education is because of the higher demand for child labour overweighs the encouraging effect of migration due to money remittances and better income levels. Nasir, *et al.* (2011) explore the impact of workers' remittances on the educational performance of children in the household's recipient these foreign remittances, using primary data at the household level is gathered from four cities of the Khyber Pakhtunkhwa, Pakistan. The ordinary least squares estimates uncovers that foreign remittances have significant negative effects on educational performance. Though, the effect becomes statistically insignificant once parental education is incorporated as a regressor in the regression process. The study of Kroeger and Anderson (2014) obtains mixed results on the impact of the receipt of remittances on the education and health of children in Kyrgyzstan during 2005-2009. The empirical findings reveal that girls in remittances' receipt households are more expected to be malnourished. However, foreign remittances fail to improve the human capital of kids left behind, while, the study observe an overall positive expansion in school enrolment among young kids between 2005 and 2009 although an adverse trend in enrolment among older boys and girls has been observed. Table 1 portrays some selected erstwhile empirical studies on the effect of migrant remittances on human capital.

Table 1

Compact Prior Empirical Studies on the Effect of Remittances on Human Capital

Author (s)	Periods, Country, and Estimator	Dependent Variable	Independent Variables	Findings
Adenutsi (2010)	1987-2007, fixed-effects 18 Sub-Saharan African countries	Human development	Remittances, government spending, trade openness, and inflation,	Remittances have significant positive long-run impact
Chaaban and Mansour (2012)	Jordan, Syria and Lebanon[4] Probit model	Education attendance	Remittances household characteristics, individual's characteristics, parent education and dwelling size	Remittances has larger effects for Jordan and Syria, while, lower for Lebanon
Hassan, *et al*. (2013)	1981-2011 Pakistan ARDL approach	Secondary school enrolment	Remittances, population growth rate, FDI, GDP per capita	Remittances have significant negative impact
Gittens and Pilgrim (2013)	1970-2010 Developing Countries GMM, OLS	School	FDI, GDP per capita growth, public sector spending, and life expectancy	FDI has a positive impact on human capital variables
Ngoma and Ismail (2013)	1970- 2010 Malaysia GMM	Schooling at secondary and tertiary levels	Remittances, population size, education expenditure and GDP	Remittances have significant positive long-run impact
Hines (2014)	2009 Kenya OLS and 2SLS	Household expenditures on education	Remittances, primary and secondary education	Remittances have significant positive impact
Acharya and Gonzalez (2014)	1995–1996 (I^{st} round) 2003–2004	School choice or the school progression of child	Migration, remittances, and non-remittance income, parents, household,	Remittances have significant positive long-run impact

[4]Lebanon (sample=13003 households), Syria (sample=29790 households. Jordan (sample=12768 households).

ARDL=Autoregressive Distributed Lag Bounds Testing GMM=Generalised methods of moment OLS= Ordinary least squares.

	(2nd round) Multinomial logit Nepal		and community	
Batu (2015)	1970-2010 OLS	Primary and Secondary school enrolment	Remittances, population, ethnic fractionalisation, real GDP	Remittances have significant positive impact

Source: Authors compilation.

3. EMPIRICAL METHODOLOGY

The study employs 18 years annual panel data from the period of 1996 to 2013[5] of 17 countries. All data are acquired from the official databases of World Bank. There are four high income countries, six upper middle income countries, six lower middle income countries and one low income country in the selected sample according to the database of World Bank of different income level countries. There are three main income level groups in the sample used. Low income and the lower middle income countries are combined to form a one group and named them as low income countries. The other two groups are for middle income and high income countries. The details of countries with their income level group are presented in Table 2. After reviewing the empirical studies, the model to analyse the relationship between workers' remittances, economic governance system and human capital development is determined by following functions:

$$H_{i,t} = \alpha_0 + \beta_1 Y_{i,t} + \beta_2 E_{i,t} + \beta_3 F_{i,t} + \beta_4 N_{i,t} + \beta_5 M_{i,t} + \beta_6 R_{i,t} + \varepsilon_{i,t} \quad \ldots \quad \ldots \quad (1)$$

$$H_{i,t} = \alpha_0 + \beta_1 Y_{i,t} + \beta_2 E_{i,t} + \beta_3 F_{i,t} + \beta_4 N_{i,t} + \beta_5 M_{i,t} + \beta_6 R_{i,t} + \beta_7 C_{i,t} + \varepsilon_{i,t} \quad \ldots \quad (2)$$

$$H_{i,t} = \alpha_0 + \beta_1 Y_{i,t} + \beta_2 E_{i,t} + \beta_3 F_{i,t} + \beta_4 N_{i,t} + \beta_5 M_{i,t} + \beta_6 R_{i,t} + \beta_7 G_{i,t} + \varepsilon_{i,t} \quad \ldots \quad (3)$$

$$H_{i,t} = \alpha_0 + \beta_1 Y_{i,t} + \beta_2 E_{i,t} + \beta_3 F_{i,t} + \beta_4 N_{i,t} + \beta_5 M_{i,t} + \beta_6 R_{i,t} + \beta_7 P_{i,t} + \varepsilon_{i,t} \quad \ldots \quad (4)$$

$$H_{i,t} = \alpha_0 + \beta_1 Y_{i,t} + \beta_2 E_{i,t} + \beta_3 F_{i,t} + \beta_4 N_{i,t} + \beta_5 M_{i,t} + \beta_6 R_{i,t} + \beta_7 Q_{i,t} + \varepsilon_{i,t} \quad \ldots \quad (5)$$

$$H_{i,t} = \alpha_0 + \beta_1 Y_{i,t} + \beta_2 E_{i,t} + \beta_3 F_{i,t} + \beta_4 N_{i,t} + \beta_5 M_{i,t} + \beta_6 R_{i,t} + \beta_7 V_{i,t} + \varepsilon_{i,t} \quad \ldots \quad (6)$$

Table 2

List of 17 Countries Included

Country	Income Level
Armenia	Lower middle income
China	Upper middle income
India	Lower middle income
Indonesia	Lower middle income
Israel	High income
Japan	High income
Jordan	Upper middle income
Kazakhstan	Upper middle income
Korea, Rep.	High income
Kyrgyz Republic	Lower middle income
Malaysia	Upper middle income
Mongolia	Lower middle income
Nepal	Low income

[5]Though, we wish to use longer period data, while for some of our incorporated variables, the data were only available between 1996 and 2013.

Oman	High income
Pakistan	Lower middle income
Thailand	Upper middle income
Turkey	Upper middle income

Source: Authors' construction.

In the above model *i* represent the number of countries in the panel and *t* represents the number of observations over time. *H* is the human capital development which is measured by the proxy of gross secondary school enrolment,[6] *Y* is the economic growth, which is measured by gross domestic product per capita, *E* is export as a percentage of GDP, *F* is the inward foreign direct investment as percentage of GDP, *N* is the per capita energy use by any individual in a country, *M* is a military expenditure as percentage of GDP, *R* is a workers' remittances as percentage of GDP. In this research we also use different variables of economic governance system to analyse the impact of governance system on the development of human capital. In the above mentioned Equations 2-6, *C* represents the control on corruption in the economic system, *G* represents government effectiveness, *P* represents political stability, *Q* represents the regulatory quality and *V* represents the voice and accountability. The detailed descriptions of all variables are presented in Table 3.

Table 3

List of Variables

Label	Full Form
S	School enrolment, secondary (% gross)
Y	GDP per capita are in constant 2005 U.S. dollars.
E	Exports of Goods and Services as percentage of GDP
F	Foreign Direct Investment as percentage of GDP
N	Energy use (kg of oil equivalent per capita)
M	Military expenditure as percentage of GDP
R	Personal remittances, received as percentage GDP
C	Control of Corruption (ranges from –2.5 (weak) to 2.5 (strong) governance performance).
G	Government Effectiveness (ranges from –2.5 (weak) to 2.5 (strong) governance performance).
P	Political Stability and Absence of Violence/Terrorism (ranges from –2.5 (weak) to 2.5 (strong) governance performance).
Q	Regulatory Quality (ranges from –2.5 (weak) to 2.5 (strong) governance performance).
V	Voice and Accountability (ranges from –2.5 (weak) to 2.5 (strong) governance performance).

Source: World Development Indicator, the World Bank http://data.worldbank.org/indicator

In this study we employ two panel unit root tests namely Im, *et al.* and Levin, *et al.* to analyse the stationary properties of variables. The present study also employs the Pedroni (1999) panel co-integration technique to analyse the long run relationship among variables. In this study, fixed-effects method is used to analyse the long run coefficients. Moreover, different interaction terms[7] of workers' remittances and economic governance system to more validate their impact on the human capital development, are used in the

[6]Most of the erstwhile studies uses secondary school enrollment [Barro and Lee (2001); Tiruneh and Radvansky (2011); Farkas (2012); Azam and Ahmed (2015)], therefore, we also prefers secondary school enrollment over the others proxies.

[7]The interaction term is used where the governance indicators (i.e., control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, and voice and accountability) has been multiplied with remittances in order to understand the effect of each governance indicator with remittances on human capital in the study.

study. Granger causality test also used to analyse the causal relationship between considered variables.

4. RESULTS AND ESTIMATIONS

To check the stationary properties of variables, the study use Im, Pesaran and Shin and Levin, Lin and Chu panel unit root tests. Table 4 represents the results of stationary tests. These tests are applied first on the level of variables, then on their first difference.

It is evident from Table 4 that all variables are stationary and integrated at first difference. This implies that the series of variables may exhibit no unit root problem and that these series of variables can be used to analyse the long run relationship.

Table 4

Results of Stationary Analyses

	Im, Pesaran and Shin				Levin, Lin and Chu			
	I(0)		I(1)		I(0)		I(1)	
Variables	C	C&T	C	C&T	C	C&T	C	C&T
S	–0.656	–1.218	–6.548*	–5.195*	–0.819	–0.111	–6.580*	–5.344*
Y	4.884	2.172	–9.596*	–7.974*	–0.262	1.263	–16.540*	–15.612*
E	0.794	–0.750	–6.364*	–5.103*	0.552	–1.013	–7.515*	–6.663*
F	3.104	0.219	–9.225*	–6.083*	1.456	–1.028	–9.882*	–6.976*
N	5.362	0.487	–6.656*	–5.103*	0.725	–1.163	–7.330*	–6.663*
M	–1.250	–0.326	–5.853*	–4.130*	–0.676	–0.987	–7.046*	–6.259*
R	–0.081	0.386	–7.407*	–5.351*	–1.057	–0.042	–8.738*	–7.792*
C	–0.269	–1.262	–9.830*	–7.111*	–1.153	–1.190	–9.318*	–6.608*
G	0.566	–0.475	–10.228*	–5.195*	–1.075	–0.351	–12.013*	–5.344*
P	–0.462	–0.065	–8.049*	–6.861*	–1.092	–0.680	–9.198*	–8.829*
Q	–1.167	1.045	–7.358*	–4.993*	–0.830	0.300	–6.445*	–3.988*
V	–0.473	–0.756	–9.766*	–8.308*	–0.179	–0.049	–10.786*	–11.268*

Source: Authors' estimation.

*, **, *** Indicates significance level respectively at 1 percent, 5 percent and 10 percent.

Since the stationary results from unit root tests confirm that each series of variable are integrated of order one. The panel cointegration technique developed by Pedroni (1999) has been used to analyse the long run relationship between our considered variables. The Pedroni's panel cointegration approach has several advantages upon other cointegration methods of panel data. This approach controls the biasness from country size and also solves the issue of heterogeneity.[8] A panel cointegration technique is examined by analysing the variables and residuals of a model. The variables should be cointegrated on $I(1)$ while the residuals should be $I(0)$ if the variables are cointegrated. The residuals of the hypothesised cointegration equation can be established from the following equation:

$$H_{i,t} = \alpha_i + \beta_i^1 Y_{i,t} + \beta_i^2 E_{i,t} + \beta_i^3 F_{i,t} + \beta_i^4 N_{i,t} + \beta_i^5 M_{i,t} + \beta_i^6 R_{i,t} + \emptyset_{it} + \varepsilon_{it} \quad \ldots \quad (8)$$

$$H_{i,t} = \alpha_i + \beta_i^1 Y_{i,t} + \beta_i^2 E_{i,t} + \beta_i^3 F_{i,t} + \beta_i^4 N_{i,t} + \beta_i^5 M_{i,t} + \beta_i^6 R_{i,t} + \beta_i^7 C_{i,t} + \emptyset_{it} + \varepsilon_{it} \quad \ldots (9)$$

$$H_{i,t} = \alpha_i + \beta_i^1 Y_{i,t} + \beta_i^2 E_{i,t} + \beta_i^3 F_{i,t} + \beta_i^4 N_{i,t} + \beta_i^5 M_{i,t} + \beta_i^6 R_{i,t} + \beta_i^7 G_{i,t} + \emptyset_{it} + \varepsilon_{it} \quad \ldots (10)$$

[8]See, Das and Choudhary (2011).

$$H_{i,t} = \alpha_i + \beta_i^1 Y_{i,t} + \beta_i^2 E_{i,t} + \beta_i^3 F_{i,t} + \beta_i^4 N_{i,t} + \beta_i^5 M_{i,t} + \beta_i^6 R_{i,t} + \beta_i^7 P_{i,t} + \emptyset_{it} + \varepsilon_{it} \quad \ldots (11)$$

$$H_{i,t} = \alpha_i + \beta_i^1 Y_{i,t} + \beta_i^2 E_{i,t} + \beta_i^3 F_{i,t} + \beta_i^4 N_{i,t} + \beta_i^5 M_{i,t} + \beta_i^6 R_{i,t} + \beta_i^7 Q_{i,t} + \emptyset_{it} + \varepsilon_{it} \quad \ldots (12)$$

Table 5

Results of Pedroni (Engle-Granger based) Panel Cointegration

Estimates	Stats.	Prob.
S = *f* (Y+E+F+N+M+R)		
Panel v-statistic	–1.098	0.864
Panel rho-statistic	3.260	0.999
Panel PP statistic	–4.170	0.000
Panel ADF statistic	–4.466	0.000
Alternative Hypothesis: Individual AR Coefficient		
Group rho-statistic	5.032	1.000
Group PP statistic	–4.698	0.000
Group ADF statistic	–4.074	0.000
S = *f* (Y+E+F+N+M+R+C)		
Panel v-statistic	–1.799	0.964
Panel rho-statistic	3.457	1.000
Panel PP statistic	–2.795	0.003
Panel ADF statistic	–2.456	0.007
Alternative Hypothesis: Individual AR Coefficient		
Group rho-statistic	5.424	1.000
Group PP statistic	–3.220	0.001
Group ADF statistic	–1.898	0.029
S = *f* (Y+E+F+N+M+R+G)		
Panel v-statistic	–1.569	0.942
Panel rho-statistic	2.971	0.999
Panel PP statistic	–4.705	0.000
Panel ADF statistic	0.208	0.582
Alternative Hypothesis: Individual AR Coefficient		
Group rho-statistic	4.963	1.000
Group PP statistic	–8.873	0.000
Group ADF statistic	–0.022	0.491
S = *f* (Y+E+F+N+M+R+P)		
Panel v-statistic	–1.162	0.877
Panel rho-statistic	3.439	1.000
Panel PP statistic	–4.866	0.000
Panel ADF statistic	–5.084	0.000
Alternative Hypothesis: Individual AR Coefficient		
Group rho-statistic	5.129	1.000
Group PP statistic	–6.270	0.000
Group ADF statistic	–4.723	0.000
S = *f* (Y+E+F+N+M+R+Q)		
Panel v-statistic	–1.199	0.885
Panel rho-statistic	3.352	1.000
Panel PP statistic	–4.954	0.000
Panel ADF statistic	–4.949	0.000
Alternative Hypothesis: Individual AR Coefficient		
Group rho-statistic	5.096	1.000
Group PP statistic	–5.983	0.000
Group ADF statistic	–4.814	0.000
S = *f* (Y+E+F+N+M+R+V)		
Panel v-statistic	–1.363	0.914
Panel rho-statistic	3.290	1.000
Panel PP statistic	–3.656	0.000
Panel ADF statistic	–4.103	0.000
Alternative Hypothesis: Individual AR Coefficient		
Group rho-statistic	5.171	1.000

Group PP statistic	–6.546	0.000
Group ADF statistic	–4.824	0.000

Source: Authors' estimation.

The null hypothesis of Pedroni's (1997) panel cointegration procedure is no cointegration.

$$H_{i,t} = \alpha_i + \beta_i^1 Y_{i,t} + \beta_i^2 E_{i,t} + \beta_i^3 F_{i,t} + \beta_i^4 N_{i,t} + \beta_i^5 M_{i,t} + \beta_i^6 R_{i,t} + \beta_i^7 V_{i,t} + \emptyset_{it} + \varepsilon_{it} \quad \ldots(13)$$

Where i=1,…., N; t=1,….,T, and N is the number of countries in the panel and T is the number of observations over time. The estimated residuals become:

$$\varepsilon_{it} = \rho_i \varepsilon_{it-1} + \nu_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (14)$$

With the null hypothesis of no cointegration, the residual is $I(1)$ and ρ_i=1. There are two alternative hypotheses. First, the homogenous alternative (within dimension test), (ρ_i=ρ) < 1 for all i, and second, heterogeneous alternative (between dimension or group statistics) ρ_i< 1 for all i.

Results indicate that in the all six models the test statistics of ADF and PP based on both within dimension and group based approach statistics demonstrate the rejection of null hypothesis of no cointegration in the favour of alternative that all considered variables are cointegrated in the sample countries. Guterrez (2003) argues that group statistics has the best power to judge the cointegration among the test statistics of Pedroni (1999). It is concluded that our selected variables exhibit a valid long run relationship.

This study uses Kao (1999) residual based panel cointegration test to analyse the long run relationship between workers' remittances, economic governance system and human capital development in the sample countries. The null hypothesis of Kao residual panel cointegration test is that there is no cointegration among the series of variables. The desirable probability to have a valid long run relationship is must be less than 0.10 which represents that there exist a valid long run relationship at significance level of 10 percent. Results of Kao residual based panel cointegation test are presented in Table 6. Results suggest that in all six models the null hypothesis of no cointegration is rejected in the favour of alternative that all considered variables are cointegrated.

Table 6

Results of Kao Residual (Engle-Granger based) Panel Cointegration

Estimates	Stats.	Prob.
S = *f* (Y+E+F+N+M+R)		
Panel ADF statistic	–2.216	0.013
Residual variance	0.016	
HAC variance	0.012	
S = *f* (Y+E+F+N+M+R+C)		
Panel ADF statistic	–1.670	0.047
Residual variance	0.016	
HAC variance	0.009	
S = *f* (Y+E+F+N+M+R+G)		
Panel ADF statistic	–1.790	0.037
Residual variance	0.016	
HAC variance	0.011	
S = *f* (Y+E+F+N+M+R+P)		
Panel ADF statistic	–2.232	0.013
Residual variance	0.016	
HAC variance	0.013	
S = *f* (Y+E+F+N+M+R+Q)		
Panel ADF statistic	–1.854	0.032
Residual variance	0.016	
HAC variance	0.011	
S = *f* (Y+E+F+N+M+R+V)		

Panel ADF statistic	–1.841	0.033
Residual variance	0.016	
HAC variance	0.013	

Source: Authors' estimation.

The null hypothesis of Kao Residual Cointegration panel cointegration procedure is no cointegration.

Results of long run estimations based on fixed effect models are presented in Table 7. Wald test[9] is used to analyse the cross section effects and period effects in the model. Results of the Wald test indicate that in all five, both hypotheses are rejected and there is a significantly difference in considered variable between countries and over time. Hausman's test is used to identify the most preferable method between fixed-effects model (*FEM*) and random-effects model (*REM*).[10] The results of Hausman test indicate that alternative hypothesis is accepted in all six models and fixed effect model is preferred over random effect model.

From the above discussion it is clear that fixed effect model is preferred in this study. Results presented in Table 7 of fixed effect model of complete sample indicate that the workers' remittance has a significant positive impact on the human capital development in the sample countries. These results suggest that the migrants' remittances play a significant role to enhance the capabilities and achievements of human capital. The migrants' remittances provide a source of income for the families of these migrants. The migrants generally get better salaries in host nation as compare to their home nation that will increase the earning opportunities and hence also increase the living standard of migrant family members in home country. The better schooling for the children and healthy environment is also an achievement from the migrants' remittances. The families in the home country also save the substantial amount of their remittances for the future events to secure their futures. The families also use their remittances for investment activities specially to buy a new house to get better living standards. These all contribution of worker' remittances play a significant role to enhance the human capital development in a country.

Results also indicate the positive and significant impact of all variables of economic governance system i.e., control on corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality and voice and accountability on human capital development. These findings suggest that the strong economic governance system play a significant role to enhance the capabilities and skills of human capital in an economy. The control on corruption will provide the sense of equality among the citizens. It will also reduce the gaps between the elites and general public in the economy which consequently decrease the stress level and enhance the sense of humanity and productivity of the general public. The government effectiveness is necessary for the development of human capital. The quality of public services, the quality of civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of government's commitment to such policies play a significant role to develop human capital. The absence of violence/terrorism elements from the society also contributes to provide the stress-free, hassle-free and relax environment to the citizens. The ability of government to formulate and implement sound policies and regulations and promote private sector

[9] See, Greene (2000), pp. 390–391.

[10] See, Greene (2000), pp. 576–577.

development also encourage the employment opportunities in the economy. Consequently, the wages level also increase which leads to develop the living standard of the citizens. The extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media also create the sense of voice and accountability among the citizens. These all discussion confirm that the workers' remittances and strong economic governance system leads to develop the human capital.

Table 7

After having the positive and significant impact of workers' remittances and strong economic governance system on the development of human capital in the complete sample, now we analyse the same relationship with different income level. Results of low, middle and high income countries are presented in Table 8, Table 9 and Table 10 respectively. Results show the positive and significant impact of workers' remittances on human capital development in all three income level countries. The highest contribution of workers' remittances on human capital development is found in low income countries. Therefore, it can be concluded that the low income countries are more rely on workers' remittances to develop their human capital. Results also show the positive and significant impact of all variables of economic governance system i.e. control on corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality and voice and accountability on human capital development in all three income levels. The highest contribution of control on corruption and voice and accountability on human capital development is found in low income. Conversely, the highest contribution of government effectiveness and political stability on human capital development is found in high income. Finally, the highest contribution of regulatory quality on the development of human capital is found in middle income countries.

4.1. Results of Interaction Terms

Table 11 represents the results of interaction terms of workers' remittances and economic governance system in full sample countries. The objective of these estimations is to analyse the influence of strong economic governance system on the relationship of workers' remittances and human capital development. Results show that the interaction terms of five governance variable with workers' remittances have positive and significant impact on human capital development. The coefficients of all five interaction terms have more value than the basic model of workers' remittances. Hence, it can be concluded that the strong economic governance system strengthen the relationship between workers' remittances and human capital development.

After having the positive and significant impact of interaction terms of workers' remittances and strong economic governance system on the development of human capital in the complete sample countries, now we analyse the same relationship with different income level. Results of low, middle and high income countries are presented in Table 12, Table 13 and Table 14 respectively. Results show the positive and significant impact of interaction terms of economic governance system with workers' remittances on human capital development in all three income level countries. The highest contribution of all interaction terms on human capital development is found in low income countries. Therefore, it can be concluded that the highest contribution of strong economic governance system strengthen the relationship between workers' remittances and human capital development in low income countries.

Table 8

Table 9

Table 10

Table 11

Table 12

Table 13

Table 14

Table 15

Results of Panel Granger Causality Test

Variables	F-Stats	Prob.
S does not Granger Cause R	0.051	0.822
R does not Granger Cause S	8.854	0.003
S does not Granger Cause C	0.091	0.764
C does not Granger Cause S	5.031	0.026
S does not Granger Cause G	0.021	0.884
G does not Granger Cause S	9.820	0.002
S does not Granger Cause P	0.014	0.905
P does not Granger Cause S	8.053	0.005
S does not Granger Cause Q	1.115	0.292
Q does not Granger Cause S	10.125	0.002
S does not Granger Cause V	0.698	0.404
V does not Granger Cause S	7.691	0.006

Source: Authors' estimations.
Note: The lag length of all focus variables is 1.

4.2. Granger Causality Analysis

Panel Granger causality analysis has been used to analyse the causal direction between considered variables. We use lag one of all variables judge the causal relationship between dependent and independent variables. The Table 13 presents the results of Granger causality analysis.

Results of Table 13 confirm that the human capital development has unidirectional causal relationship of with all our focus variables i.e. workers' remittances and all five dimensions of good governance. The direction of the causal relationship is run from regressor to human capital development in all considered focus variable. These findings confirm that our considered focus variable has significant causal influence on human capital development.

5. CONCLUDING REMARKS

This study investigates the influence of workers' remittances along with economic governance system on human capital development in 17 countries by using the annual panel data of 18 years from the period of 1996 to 2013. The study employs five different variables of economic governance system to analyse the impact of governance system on the development of human capital i.e. control on corruption in the economic system, government effectiveness, political stability, regulatory quality and the voice and accountability. Three main income level groups are formed in the sample while the low income and lower middle income countries are merged to form a one group and named them as low income countries. The other two groups are for middle income and high income countries.

Pedroni panel cointegration and Kao residual panel cointegration approaches confirm the valid long run relationship between considered variables. Results of fixed effect model complete sample indicate that the workers' remittances have a significant positive impact on the human capital development. Results also indicate the positive and significant impact of all variables of economic governance system on human capital development. Results of low, middle and high income countries show the positive and significant impact of workers' remittances on human capital development in all three income level countries. The highest contribution of workers' remittances on human capital development is found in low income countries. Results also show the positive and significant impact of all variables of economic governance system on human capital development in all three income levels countries. The highest contribution of control on corruption and voice and accountability on human capital development is found in low income countries. Conversely, the highest contribution of government effectiveness and political stability on human capital development is found in high income countries. Finally, the highest contribution of regulatory quality on the development of human capital is found in middle income countries.

The empirical results show that the interaction terms of five governance variable with workers' remittances have positive and significant impact on human capital development. The coefficients of all five interaction terms have more value than the basic model of workers' remittances. Hence, it can be concluded that the strong economic governance system strengthen the relationship between workers' remittances and human capital. Results also show the positive and significant impact of interaction terms of economic governance system with workers' remittances on human capital development in all three income level countries. The highest contribution of all interaction terms on human capital development is found in low income countries. Results of Granger causality confirm that the human capital development has unidirectional causal relationship with workers' remittances and variables of economic governance system. The direction of the causal relationship is run from regressor to human capital development in all considered focus variable. These findings confirm that our considered focus variables have significant causal influence on human capital development in countries. In this way, overall this study supports the prior studies that migrant remittances lead to a positive influence in human capital measure by schooling.

Empirical findings of the study suggest that apart from promoting good governance, appropriate and effective macroeconomic policy is required in order to attract more international remittances and promote human development. Similarly, exclusive policies including condensing the cost of money transfers from overseas and improving mechanisms to utilise migrant's remittances more efficiently needs to be fuelled. Every state needs to ensure that they generate the facilitating environment that will enhance investment into constructive infrastructure. Consequently, the enhanced level of investment through migrant remittances will certainly generate more employment opportunities.

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Book Reviews

Kamran Asdar Ali. *Communism in Pakistan: Politics and Class Activism 1947-1972.* London, U.K.: I. B. Tauris & Co. Ltd./Philip Wilson Publishers Ltd. 2015. 304 pages. £ 59.00.

The book is divided into two parts consisting of eight chapters, including the introductory and concluding chapters, and an epilogue. It is a 304 page book including notes and references, which are not only interesting but are very helpful for any reader interested in the topic. The introductory chapter sets the stage for the reader, introducing her to the diversity of nations living in the geographical boundaries of Pakistan and points to the failure of their integration in the state project. The author also touches upon the ethnic and nationalistic struggles played out in Pakistan throughout history and their relationship with the politics of the left. Furthermore, he reiterates that mainstream discourse on Pakistan's history presents the struggle for separate nation in unified India as a struggle of a monolith Muslim nation in the sub-continent largely ignoring the ethnic, cultural and linguistic diversity of these Muslims, thereby undermining their aspirations for freedom, self-determination and autonomy. The Bengali and the Baloch freedom movements have been cited as examples of what he calls the "collective amnesia" of the nation and notes that resistance, or left-leaning, movements have also been largely ignored in mainstream discourses on the history of Pakistan.

The author also builds the case around the use of other forms of representation, such as art, fiction and poetry in digging out alternative histories that are missing from the grand narratives; a method that has been employed in the book repeatedly. The chapter also introduces us to the members of the earliest left-wing party of the country, the Communist Party of Pakistan (CPP). The members of the CPP all belonged to the Communist Party of India (CPI), who mostly were men from the highly-educated elite Muslim families of North India (not indigenous to the areas that became a part of Pakistan) and their deep commitment to the cause was manifest in their personal lives. A glimpse of the political climate of the new-born state in which the CPP was operating is provided.

Chapter one describes the creation of the Communist Party Pakistan (CPP) after the division of the Communist Party of India (CPI), which itself is also briefly introduced. The author uses literary texts, such as Saadat Hasan Manto's short stories, to depict the chaos and confusion of these times. The confusion around a framework to understand the dynamics of change that was taking place at the time of India's partition and to predict what would follow such an event is also manifest in the CPI's stance towards partition. The communists first regarded the demand for Pakistan as a ploy employed by elite leadership of the All India Muslim League to weaken the struggle of the common people of India against the British colonialists. However, their stance changed and they started to regard the partition of India into two states as the right of autonomy to all nations. Internal divisions in party followed but the CPI grudgingly

accepted the creation of Pakistan and also divided the CPI into CPI and CPP. However, some of the influential members of the CPI continued writing and speaking in support of their earlier arguments. The tumultuous relationship of the CPI with the Indian National Congress and the All India Muslim League are also delved in the book in considerable detail.

Chapter two focusses on the working of CPP since 1948 and familiarises the reader to other left-leaning organisations working in the areas of India that later became Pakistan. The most important task present to the CPP at the time was to form an organised political party and reach out to the masses, particularly the unionised labour in the very small industry, within meagre financial resources. However, the CPP was operating in a very hostile environment and the state treated the CPP with immense suspicion since its inception which culminated into an outright ban of the CPP after the Rawalpindi conspiracy in 1954.

In addition to extending the theme of the book, Chapter 3 primarily concerns with the All Pakistan Progressive Writers Association. The author explicates on the discussions that took rounds in those times. Like the CPP, the All Pakistan Progressive Writers Association was also grappling to find a framework for themselves to work in and the internal debates on various literary texts are used to highlight the prevailing confusion. The chapter also outlines some of the counter movements and criticism of the All Pakistan Progressive Writers Association, which highlights further the environment that the left in Pakistan was operating in.

It was the implication of some of the members of the CPP in the Rawalpindi Conspiracy that gave the state of Pakistan the chance to violently crush the CPP. Chapter 4 discusses in detail the infamous attempted coup from within the ranks of the Pakistan army. The writer provides the different accounts of the incident but like many others does not attempt to bring closure to the event. However, according to Asdar Ali, the timing of the declassifying of some of the details of the attempted coup seem to suggest that it was used to undermine the politics of the left in Pakistan; particularly that of the CPP and it gave the state a further chance to malign the communists as anti-state and anti-Pakistan. The chapter also details how the American and British intelligence agencies assisted the Pakistani state apparatus in subverting the communist activities in the country in order to safeguard their interests in the region and to counter the Sino-Soviet influences. The Intelligence cells instituted by these foreign intelligence services were instrumental in spreading an anti-communist rhetoric through various means even invoking religion to extend their agenda and labelling them as anti-Islam.

Chapter 5 chronicles what little we know of the life, work and death of the revolutionary Hasan Nasir. His tragic murder has led him to be a given the status of a martyr. The inimical political environment surrounding the times around his life are pictured as well including the internal rifts of the left-wing politics. The chapter also details some of the international influences, that is, a pro-Soviet side and a pro-China side on the left in Pakistan, that were beginning to show what would later become major divides within the left.

Karachi, the biggest metropolitan of the country, has the largest concentration of industry and therefore of industrial labour. Karachi was the site of major labour strikes under the Bhutto government. The government’s response to the strike and the use of

brute force against the labourers in Karachi stand in sharp contrast to the Bhutto's socialist rhetoric. The chapter describes in detail the environment in Karachi at the time of labour trouble under the Bhutto government, the problems faced by industrial labour, their demands, their means of actions and the state's response to it. The chapter also sheds light on the then emerging ethnic conflicts showing how the class struggle became messy when the proletariat's other identities were invoked.

In the chapters titled Concluding thoughts and Epilogue, the author brings together the lessons learnt from the class politics as played out in the preceding decades. The chapter shows that there ran many fault lines across the communist movement in Pakistan as across any other movement. The movement itself was marred by internal divisions and strife, but more so the industrial proletariat or the vanguard of the Marx's revolution became internally divided. To simplify to the extent of being caricaturised, Marx's revolutionary vanguard's enthusiasm for a proletariat revolution goes unquestioned in classical Marxist tradition but in real life the daily lives of the poor are characterised by "messiness and multiplicity" where an unending struggle for a cause becomes almost an impossibility**.** The author also goes back and relates these rifts to the creation of Pakistan under the one-nation-one-religion slogan and takes the contemporary ethnic and sectarian violence as its inevitable outcome.

Now, if we were to look at the mainstream discourse on Pakistan's history, we know that there is no such thing as the *"left"*. *"Communism"* is a thing of the past that happened in Eastern Europe and Russia and it died there because it was doomed. In the post-General Zia-ul-Haq, post-cold-war times in Pakistan, student politics has remained banned, there are no ideological student unions. There is very little space for discourses that are not *"the state or the Pakistani discourse"*. The contemporary political parties are just different shades of right and even the society at large has right-wing proclivities and hence many perhaps even do not know that there was in fact a Communist Party of Pakistan. Only the Pakistan People's Party (PPP) is commonly associated with socialism but most are unfamiliar with the brutal crushing of the labour movement during Bhutto's regime. In such state of affairs the book certainly is a much needed, very significant and important addition to study of history of Pakistan. Furthermore, the book also exposes the Pakistani state's harsh attitude towards politics of resistance of any sort from the very beginning also reflecting the authoritarian tendencies of even some of our most beloved leaders. It has immense importance for students and also for those who are otherwise interested in the state and society. It presents alternative to what the official accounts or more dominant discourses have been. The author has researched extensively, has cited published books and articles, gone through archives on Pakistan's history and politics in renowned research institutes, has conducted interviews with people directly or indirectly engaged in the movements, and also has gone through police records and publications of the CPP.

However, just like any other book, it is not exhaustive. The book opens up a discussion and there is ample room for academics to follow suit and trace the history of class struggle and activism in Pakistan. Some of these shortcomings the author himself admits and were clearly out of the purview of the text including the fact that it has traced the history from 1947-1972, and just as we know little of the grassroots struggle of the Indian National Congress against the colonialists we do not have enough information on

the struggle of the communists/socialists/Marxists of those times. Also, it ends during the Bhutto period but there is again a lot that needs to be written about the communism in Pakistan under General Zia and after.

The title of the book reads "Communism in Pakistan: Politics and Class Activism 1947-1972", however, a predominant focus of the author is on the Communist Party of Pakistan so much so that it appears as a history of the CPP rather than of communism. Several left-leaning organisations are mentioned in passing on several occasions in the book but are not delved any deeper. We are not introduced to the workings of the several left-leaning student unions of those times, we do not know what the structures and functions of the several trade-unions, peasant unions looked like, we do not know what their debates and discussions were, how they communicated with the masses and how they reacted to it. The author has gone in some detail into the functioning of the All Pakistan Progressive Writers Association, the cultural mouthpiece of the CPP but, for example, the "woman question", believed to be an integral part of politics of the left, is ignored completely. Some of the other important events that I think were worth mentioning but have not been in the book are the peasants' movements in NWFP (now Khyber Pakhtunkhwa–KPK) and even perhaps the involvement of leftists/ communists/socialists in the guerrilla movements in Balochistan. Moreover, even within the CPP, the author has given details of some of the more important figures in the movement but many others remain in the background and most particularly those belonging to the working classes who could not opt to go out of the country when states repression became too much to take. It almost looks like that even the communist movement in Pakistan was also inflicted with an elite-capture.

The Pakistani state was very suspicious of the activities of the CPP or any other communist network in the country since independence, the arrests warrants of many members of the CPI (later the CPP) were issued under the British Raj (including the warrants against Sajjad Zaheer, the first General Secretary of the CPP) and continued even after independence, the banning of the CPP after the Rawalpindi Conspiracy is understandable perhaps but the reasons for state's outright hostility towards the CPP are not explained leaving the more sceptical readers rather unconvinced. As I. A. Rehman has written in the review of the book *"Yet he does not investigate the possibility that the state might have decided to crush CPP before it had done anything because Pakistan mattered in the eyes of the cold war stalwarts only as a bulwark against international communism and that this was the condition for their support for its creation* [Rehman (2016)].

Sundus Saleemi

Pakistan Institute of Development Economics,
Islamabad.

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Naeem ul Haque. *Transforming the Inchoate Duty of Samaritanism into an Obligation.* Islamabad, Pakistan: Innovative Development Strategies. 2014. 302 pages. Pak Rupees 600.00

"Transforming the Inchoate Duty of Samaritanism into an Obligation" is the last book of Naeem ul Haque's life. It is edited by Uzma Cheema and Nina Gera and published by the Innovative Development Strategies (IDS), Islamabad. The book contains seven chapters. Chapter 1 introduces the purpose of the book and the issues discussed in it. Chapter 2 deals with the challenges of global poverty, while Chapter 3 links poverty with the changes in international law, mostly associated with aid and grant to developing countries. Chapter 4 defines the official development assistance (ODA) and discusses the history and issues related to it. In addition to that, Chapters 5 and 6 throw light on the various cases for and against the aid. The last chapter of the book, Chapter 7, discusses the transactional efforts to transformational outcomes.

The book starts with discussion of one of the major issues facing the world, i.e. the alleviation of dehumanising global poverty. It starts with explaining how most of the developing countries are trapped in the vicious circle of low incomes, savings, and investment. The author argues that, therefore, these countries need continuous and quality (ODA). The aid, in general, is a small amount to mark significant impact on any country's development but it puts pressure on revenue of every government.

Chapter 2 points out several key poverty challenges that the world is facing currently. Expressing his views on extreme poverty, the author argues that it is probably the single worst feature of shining and progressive world. Eight million people are dying just because of poverty in developing countries. Out of seven billion people in the world, three billion are living below the poverty line according to two dollar a day poverty line, which is based on purchasing power parity (PPP). Twenty percent of the population goes to bed starving every night, 885 million do not have access to safe drinking water, 26 billion lack basic sanitation and a million children do not reach the age of five.

Reduction in poverty requires a wide spectrum of measures including qualitative, attitudinal and institutional changes, adoption of sound macroeconomic and inclusive growth policies, improvement in governance, strengthening the mechanism and processes for the mobilisation of domestic resources, encouraging the flow of investment, and securing adequate and high quality concessional resources and technical assistance from external partners. Apart from discussing severity of poverty and its possible eradication policies, the chapter also discusses various issues related to poverty, such as income poverty and poverty trap, causes of poverty, and impact of different global policies on poverty.

Chapter 3 deals with the international law. The chapter elucidates major concerns, needs and expectations of developing countries related to international law to shape economic development and the transfer of concessional resources from rich too poor countries. Moreover, the transformation of international law is explained in the historical context from the era of Christian European Nations (1648 – 1856) to the era of peace-loving nations (1042-to date). Different forms and sources of international law, such as right to development, hard and soft law, community law,

UN charter and General Assembly resolutions are discussed in detail that have normative effect on the world. Emphasising the global governance, Haque discusses several key issues and challenges for classical models of international law, including moral and legal orders of governance.

ODA is one of the forms of international transfers. These transfers are from the government of developed countries to the government of developing countries in the form of financial transfers and technical assistance. Chapter 4 elaborates different types of ODAs, ODA's historical importance and issues pertaining to it. Importance of ODA for economic development is a major thesis of this book, which is intensively discussed in this chapter. After the discussion on the financial crisis, the chapter explains that the importance of ODA has increased substantially. It discusses several dimensions of ODA, including bilateral and multilateral development assistance. Author emphasises on the quality of ODA instead of quantity of aid in this chapter. The author defines quality of ODA as the per dollar capacity of aid to increase development and reduce poverty.

Chapter 5 discusses the case against aid. Three types of critiques are discussed in this chapter i.e., critiques by ultra-right, ultra-left and disappointed friends of ODA. Ultra-right challenges the concept of development assistance that aid is provided to break the vicious circle of poverty but this does not end it but results in wastage of vast resources of taxpayers of affluent countries. They oppose the poverty trap way of thinking. The ultra-right supports internally financed development. They suggest developing countries to finance their projects internally instead of getting aid from developed countries. Quoting Helen Hughes, who was an Australian economist, the author, says that provision of aid reduces the impetus for political reforms and other beneficial market reforms.

The ultra-left critics, on the other hand, oppose the ultra-right's critique. Nonetheless, they also oppose the benefits from aid. According to them, aid provision to developing countries is just for the masses and it does not benefit the poor. In addition, they strongly argue that imposition of conditionalties lead to many political and economic costs. The disappointed friends of ODA belong to a specific group who used to advocate the benefits of aid but due to lack of empirical evidence they started opposing it. Besides the three school of thoughts, this chapter comprehensively reviews the quantum of aid, which has, although, increased over the last seven decades but is insufficient to have any impact, especially on poverty. For instance, just to achieve Millennium Development Goals (MDGs) targets, the total amount of aid needed is four times the amount provided to the developing countries. Therefore, the impact of aid to achieve MDG targets is insignificant due to non-provision of substantial aid.

Discussing the quality of aid, the author argues that aid provided did not focus on development and poverty reduction. According to the author, the four major focuses of quality are maximum efficiency, fostering institutions, reducing burden, and transparency and learning. Although few efforts were made to improve the quality of aid in the Paris Declaration 2005 and the Accra declaration 2008 but improving the quality faces problems in implementing agenda due to corruption and misgovernance.

Chapter 6, in contrast to chapter 5, reviews the arguments in support of aid. Discussing three important aspects involved in aid effectiveness, this chapter explains

that self-interest is vital for utilising aid. Haque argues that if self-interests are based on greed then aid is anti-development. The second aspect is ethical consideration of the developed countries towards developing countries that deals with moral responsibility to help fellow countries. Third aspect deals with obligation, which emanates from the Rawl's concept of imperative of justice. It states that even if institutions are efficient and well-arranged but are unjust then it is not the best for development. Arguing in favour of aid, this chapter points out possible positive points of aid, namely it fills the gap of resources to achieve sustained economic growth, which helps in eradicating poverty. Aid effectiveness depends on institutions and policies of recipient countries, therefore, reforms are necessary. At the same time, the policies of the recipient country need to be consistent. Citing many empirical studies, the author argues in favour of aid effectiveness. For instance, the World Bank research suggests that the ODA can directly lift thousands of people out of depths of poverty.

The last chapter deals with paradigm shift of international law as well as behaviour of countries and implementation of strategies. It also discusses fault lines of neo-liberal and neo-conservative policymaking. Author agrees that just giving aid is not a solution to the problem of poverty. Several prerequisites are required to get maximum benefits from aid. The author, in this book, has tried to develop an argument in favour of aid. According to the author, even though aid may not be as beneficial as it is advocated but if developed world wants to help in the development of developing countries then they should be allowed to do so through aid. However, the author contends that the objective of aid should not be charity but a matter of right. To strengthen his claim, the author quotes Mahbub ul Haq:

> *"… a framework should be based on some internationally accepted needs of the poor rather than on the uncertain generosity of the rich. …"* (p. 220)

Although the book comprehensively reviews the impact of aid in the developing countries, nevertheless, few aspects have remained untouched. For example, Clemens, *et al.* (2011) discuss several possibilities for aid to effect growth, which are absent from the empirical literature cited in the book. Also, one of the most vital of these aspects is the timeframe of aid to impact growth, inequality and poverty, which is also not touched upon in the book. Inequality is among the top reasons for severity of poverty, which has markedly increased both within and across countries. Since 1980s income inequality has risen in more countries than it has fallen. For example, income share of very few developing countries notably Brazil. China and India has increased while, income share of African countries has declined by 2 percent of global income.

The book reviews the aid among the important determinants of poverty reduction but link between inequality and poverty due to aid particularly is not established. Most importantly, the amount of aid is not substantial to improve the situation of developing countries unless the prerequisites discussed in the book are fulfilled or aid is provided in the on-going projects in the developing countries, which help them to mitigate the problem of having lesser finances. Instead of following donor-driven agenda blindly, the governments of each country can work with the donor agencies to form a policy in which

interest of all stakeholders are taken into account. This would help in effectively implementing the aid money to reduce inequality and poverty.

M. Ali Kemal

Pakistan Institute of Development Economics,
Islamabad.

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Shorter Notice

Asian Development Bank (ADB). *How Inclusive is Inclusive Business for Women—Examples from Asia and Latin America*. Manilla, Philippines: Asian Development Bank. 2016. x+60 pages.

Asian Development Bank's report on improving the economic situation of women examines the potential of inclusive business for empowering women. The report defines inclusive business as a business activity in the private-sector, with systematic impact to the benefit of low income communities. This report evaluates 104 Asian Development Bank (ADB), Inter-American Development Bank (IDB), and International Finance Corporation (IFC) inclusive business investments which were active in 2015. Of these 104 inclusive business investments, this report examines 13 of these companies in depth about how they contribute to women's economic empowerment. The evaluation shows that there are only a few inclusive business models that directly promote gender empowerment. The report emphasises that although there are many initiatives promoting gender-related issues, these projects remain small in scale and have negligible impact. At the same time, it is argued in the report that the inclusive business has great potential in helping women improve their capacity to bring about economic change for themselves. It has great potential to address the need to expand women's access to goods, services, and income opportunities by involving women in a company's main activities. The most prominent feature of the inclusive business is that it can enhance women's empowerment in respectable ways. According to the report there are two ways in which inclusive business may enhance women's empowerment. First, women may be implicit beneficiaries of inclusive business models, that is, inclusive businesses provide services or products in areas in which women are typically at a disadvantage. In such areas, inclusive businesses often create tangible benefits for women. The second way involves women as explicit beneficiaries. Inclusive business models with this goal in mind may take measures to target women specifically in creating economic opportunity. The initial evidence suggests that inclusive businesses are bringing positive change to women's lives. Compared to mainstream business, inclusive businesses benefit women by paying higher wages or prices and taking care of health and safety concerns, among other things. Highlighting the hurdles in making inclusive business a success, the report argues that the companies which ignore the barriers faced by women in society often overburden them and run the risk of failure. These barriers, as well as their associated issues for companies, are rooted in underlying gender norms. The report identifies four broad constraints that are pervasive throughout the developing world for companies engaging low income women in their value chains. These constraints are women's multiple

commitments, gender-based expectations, insufficiently protected rights and agency, and a lack of skills. The report shows that the companies, featured in this report, pursue a variety of solutions to these constraints. Some companies establish support systems for women to cope with the burden of multiple commitments, others collaborate with nongovernmental organisations (NGOs), and still others work with families and communities or build women's skills. Furthermore, the report rightly highlights that women's economic empowerment is a complex social process that demands the determination and collaboration of all societal actors. The private sector can do much more to scale up inclusive businesses and strengthen gender-inclusiveness. Notwithstanding the positive role of the private sector, the report warns that the private sector alone cannot achieve the desired results and the public sector must also demonstrate clear commitment to strengthening women economically by establishing the legal framework for inclusive business and introducing policies that help women lift themselves out of poverty. Development partners can also play a role in coordinating and strengthening the conditions in which women inclusive businesses can grow. They can also act as financiers of smaller businesses, particularly since the more innovative women-inclusive initiatives often come from social enterprises. In addition, academic and research institutions need to focus more on identifying practical examples of what works and what fails. Put simply, the private sector, public sector, development partners, and academic and research institutions must work in close collaboration to realise the potential of inclusive business for women's empowerment. In sum, this report is a valuable contribution to understanding intricacies involved in making inclusive businesses, which aim at women empowerment. [*Omer Siddique*].